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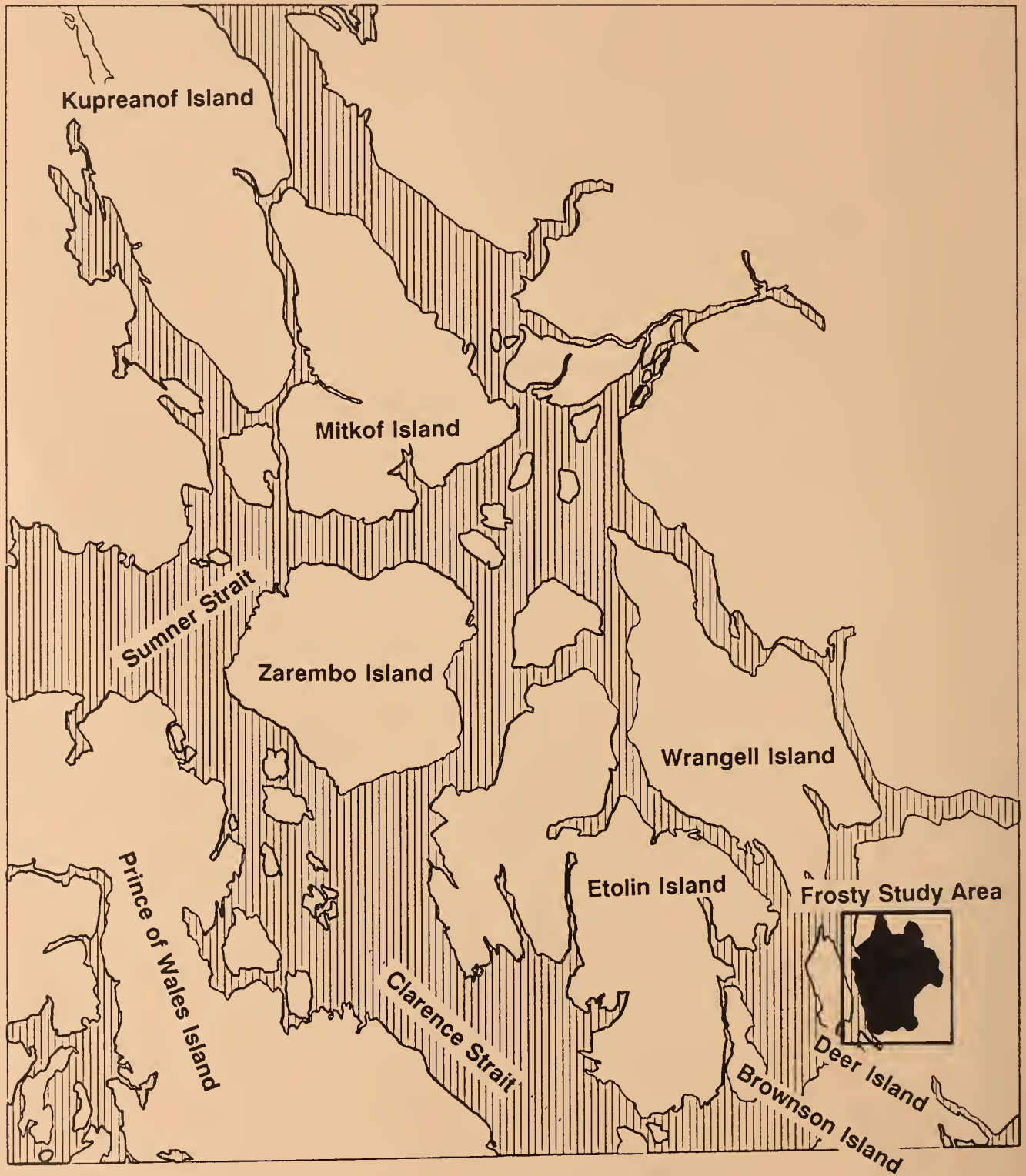


Tongass
National
Forest
R10-MB-84

Frosty Bay Draft Environmental Impact Statement



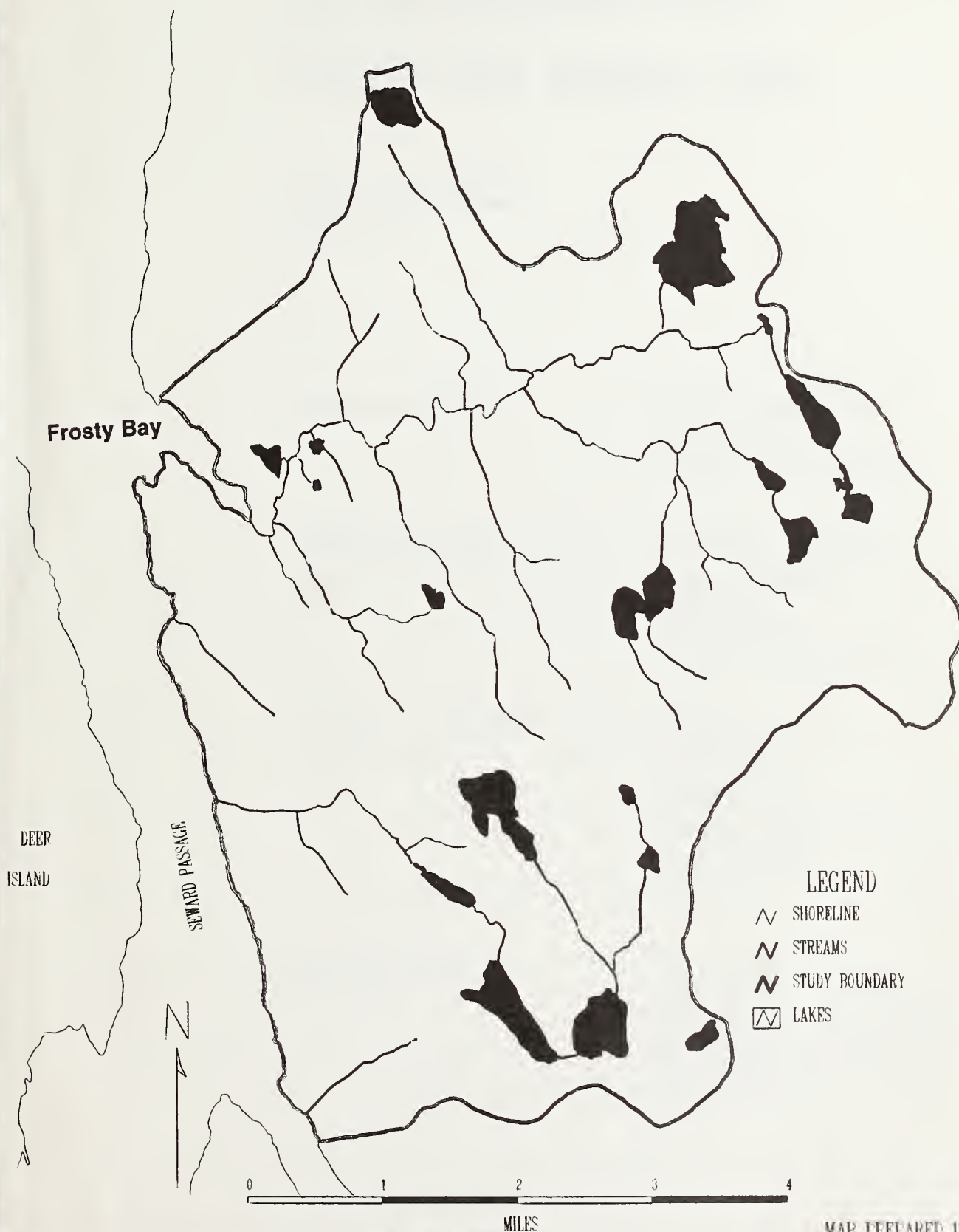
Location Map, Frosty Study Area



MAP PREPARED 11/24/89

By tjeffries

Frosty Study Area



MAPSCALE 163360

MAP PREPARED 11/15/89

By tjeffries



Draft Environmental Impact Statement

Frosty Bay Timber Sale

**U.S.D.A. - Forest Service
Tongass National Forest
Stikine Area**

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*Comments Must Be
Received:*

*Within 60 days of the date of
publication in the Federal Register.
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Summary

Introduction

Independent timber sales are required by the Tongass Land Management Plan (the Forest Plan) in order to maintain a supply of timber for forest industries in southeast Alaska. The Cleveland timber sale was first proposed on the Cleveland Peninsula, on the Wrangell Ranger District, in 1983. The area is identified in the Forest Plan as land-use designation (LUD) IV, "for intensive resource use and development where emphasis is primarily on commodity or market resources." Two environmental assessments were prepared and two decision notices signed in 1984, one for a timber sale and one for a log transfer facility. The sale was deferred, however, due to poor market conditions. It became more attractive when market conditions improved.

In 1987 a new analysis was begun and a sale planned for offer in 1990. The environmental assessment and decision notice for the log transfer facility were considered adequate, but Forest Service managers decided to document the sale with an environmental impact statement and the sale was renamed Frosty.

Resource inventories developed previously were supplemented with additional information. Although Alternative D was selected in the Cleveland environmental analysis, it was no longer considered acceptable. Four new alternatives were considered, along with the option to select additional helicopter units.

Alternatives Considered

- | | |
|--------------------------|--|
| Alternative 1 | No action. Existing conditions maintained. Area would remain undeveloped and timber harvest would be deferred. |
| Alternative 2 | Approximately 28 million board feet of timber would be harvested on 1439 acres and 14.0 miles of specified road* would be constructed. |
| Alternative 3 | Approximately 22 million board feet of timber would be harvested on 1133 acres and 14.0 miles of specified road* would be constructed. |
| Alternative 4 | Approximately 17 million board feet of timber would be harvested on 862 acres and 11.6 miles of specified* road would be constructed. |
| Helicopter Option | Provides the option to add additional helicopter harvest units to any of the action alternatives. Up to 12 million board feet of timber could be harvested on 574 acres. This volume was considered uneconomical in the previous analysis, but has become more attractive with improved market conditions. |

* The location and construction standards of these roads are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

Consequences

Each alternative provides a different mix of resource outputs that emphasize different resource values.

Vancouver Canada Goose

The most unique resource value within the Frosty area is the presence of breeding and rearing areas for the Vancouver Canada goose. Goose habitat has been protected with each alternative by leaving trees standing in goose habitat along Class 1, Class 2, and Class 3 streams. Even so, the degree of protection varies. Alternative 1 provides the greatest protection because there would be no development. Of the action alternatives, Alternative 4 provides the greatest protection followed by Alternative 3 and then Alternative 2.

Recreation

Frosty Bay is sometimes used as an anchorage by recreational boaters and commercial fishermen in stormy weather. There is some risk that the size and location of one harvest unit in Alternative 2 would allow wind to blow across the previously protected anchorage.

Inland recreation access would be improved by the construction of roads. Alternatives 2 and 3 provide the greatest access, Alternative 4 provides some access, while Alternative 1 provides no road access.

The nature of recreational opportunities would change from Primitive and Roadless to Roaded and Modified. Alternatives 2 and 3 would create more change than would Alternative 4, and Alternative 1 would maintain current recreational opportunities.

Visual Resources

In a Forest-wide inventory process, the visual quality objectives for the Frosty area have been established as "Modification" in the areas seen from saltwater travel routes and "Modification" and "Maximum Modification" in the unseen areas. The visual condition in Alternatives 1 and 4 would have less impact than the inventory VQOs allow; the visual condition in Alternative 3 meets inventory visual quality objectives (VQOs); in Alternative 2 the visual condition does not meet the inventory VQOs.

Mitigation of Consequences

If an action alternative is selected, the following steps are suggested as part of the sale and layout requirements to mitigate consequences:

- (a) The contractor will be required to provide a floating camp.
- (b) If needed, a sortyard could be located near Unit 5, away from Frosty Bay, for sorting logs prior to placement in water.
- (c) The log transfer facility and bridges will be temporary structures and will be removed following sale activities.
- (d) The Forest Service administrative facility will be designed for use as a recreational cabin once administration has been completed. Landscape design principles will be used in the design and siting of the administrative cabin.
- (e) The sale area improvement plan, funded by Knutson-Vandenberg (KV) timber sale receipts, will include:

1. Probable construction of a fish pass over the first barrier falls in Frosty Creek.

2. Studies to evaluate the impacts associated with timber harvest activities on breeding Vancouver Canada geese within the sale area.
- (f) 330-foot buffers will be established around eagle nest trees. Cultural sites will be protected. If additional sites or trees are discovered once the sale is in operation, protection measures will be put in place.
- (g) Aquatic Habitat Management Unit (AHMU) guidelines will be followed for harvest near Class 1, Class 2, and Class 3 streams.
- (h) Landscape design principles will be used in the design and rehabilitation of the log transfer facility, rock pits, harvest units, specified roads and spur roads. (See Appendix C for details on treatment of the rock pit near the log transfer facility.)
- (i) The resource protection standards for helicopter units will be consistent with protection established for the preferred alternative in this EIS.

Alternative Preferred by the Forest Service

The alternative preferred by the Forest Service is Alternative 3 with some or all of the 574 acres in the helicopter option. It offers the best opportunity to provide timber volume for the needs of industry while adequately protecting other resources and uses in conformance with the Forest Plan.

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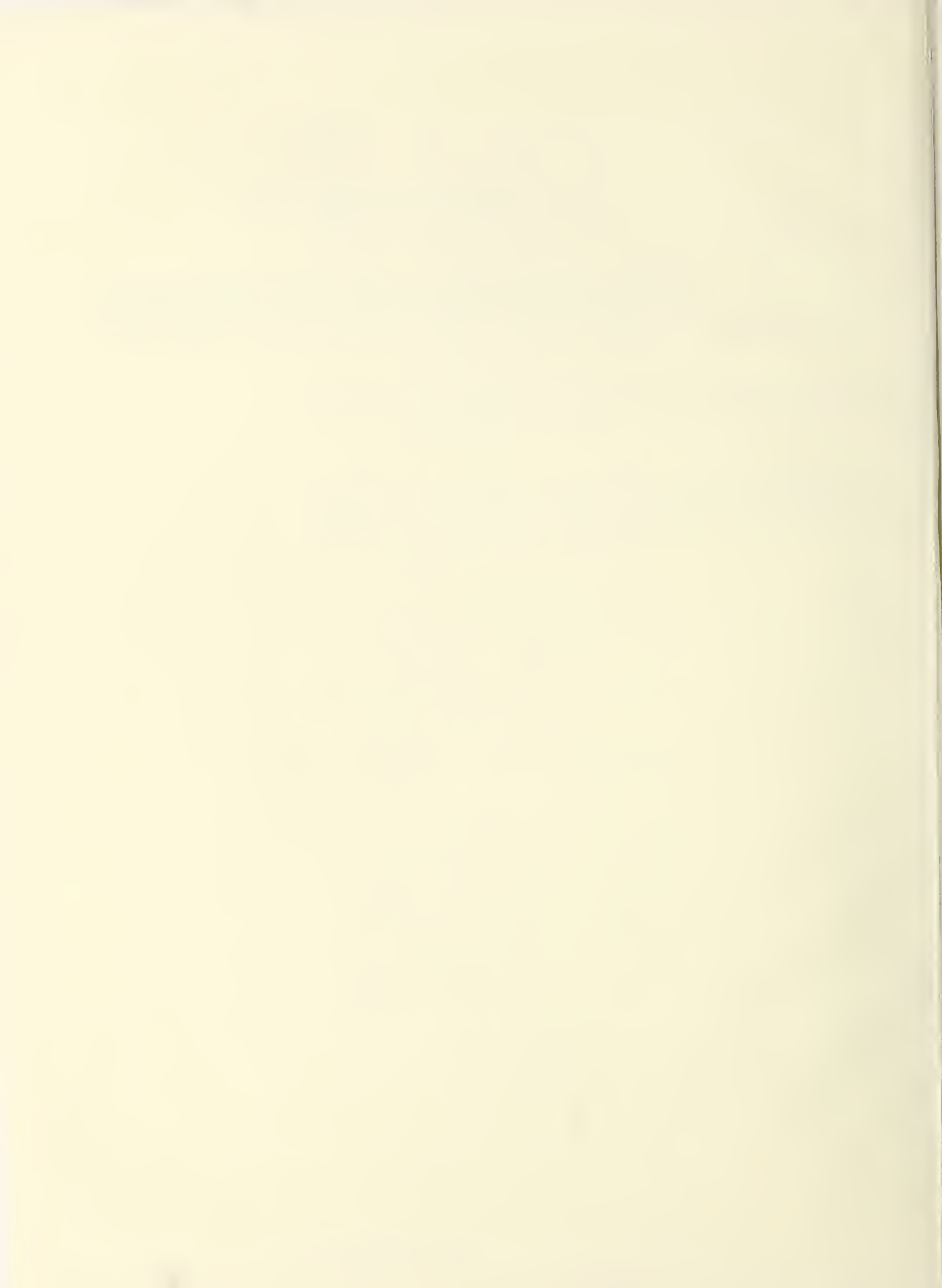
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Chapter 1

Purpose and Need



Chapter 1

Purpose and Need

Introduction

Purpose of the Project

The purpose of this project is to provide an independent timber sale in the Frosty Creek drainage and three adjacent drainages, collectively called the Frosty study area. The sale is located on the Wrangell Ranger District of the Stikine Area, Tongass National Forest. The proposed sale would help fulfill the government's commitment to the timber industry, as provided in the Forest Plan and the Alaska National Interest Land Conservation Act (ANILCA). The Frosty study area was selected for this short-term timber sale because:

1. It contains an adequate volume of timber on operable, commercial forest land to provide a profitable sale at mid-market prices;
2. It has been specifically identified in the Forest Plan as land use designation IV (LUD IV), for "intensive resource use and development where emphasis is primarily on commodity or market resources;" and
3. It is outside the long-term contract area and has been specifically identified in the Forest Plan for management "oriented to the development of short-term sales for the independent logging community."
4. It is outside of the areas Congress is currently considering for wilderness designation.

The study area is located on the Cleveland Peninsula, adjacent to Seward Passage in Ernest Sound (see map inside front cover). It consists of the Frosty value comparison unit (VCU 524) in the Deer Island Management Area (S-33).

Purpose of the Environmental Impact Statement

This Environmental Impact Statement (EIS) describes alternative approaches to harvesting timber in the Frosty study area. It describes the environment that would be affected by the project, discloses the significant environmental consequences of each alternative, and responds to the issues identified in the public scoping process. Finally, it identifies the alternative preferred by the Forest Service.

Decisions to be Made

The environmental impacts documented in this Environmental Impact Statement provide the basis for the following decisions to be made by the Stikine Area Forest Supervisor and documented in the Record of Decision (ROD):

- a. Will timber harvest and road construction take place in the planning area at this time?

1 Purpose and Need

b. If timber harvest and road construction will take place, how much will occur and where will the units be located?

c. If timber harvest and road construction are to occur, what special measures, in addition to the normal standards and guidelines, will be needed to protect resource values for fish, wildlife, recreation, and visual quality of the area?

Background

The Tongass Land Management Plan designated various parts of the Forest for different mixes of resource use. The Forest was divided into approximately 850 land areas called value comparison units (VCUs), each consisting of a major watershed or group of minor watersheds. The degree of development and related resource protection intended was indicated by assigning a land use designation (LUD) to each of the VCUs. Designations range from LUD I, wilderness management, to LUD IV, emphasizing maximum resource development with appropriate environmental constraints.

A position paper was developed for the Cleveland Timber Sale in December, 1982 and an interdisciplinary study team was formed in July, 1983. Public involvement in the process started in August, 1983 with letters sent to many groups and organizations, notice placed in local papers, and personal contact made with individuals who expressed interest.

The interdisciplinary team (IDT) evaluated several alternatives in an Environmental Assessment and recommended a timber harvest of approximately 31 million board feet (MMBF) in a single entry, along with the associated road system. The decision notice was signed by the Forest Supervisor in October, 1984 based on the team's recommendation. A copy of the Cleveland Decision Notice appears in Appendix A.

In conjunction with the timber sale analysis, a second IDT evaluated possible locations and designs for a facility in Frosty Bay to transfer the logs from land to saltwater. Their work resulted in an environmental assessment (EA) in 1984 addressing four sites and recommending a site on the south shore near the mouth of Frosty Bay. The decision notice (DN) was signed by the Stikine Area Forest Supervisor on August 6, 1984, selecting the south shore site with a temporary log crib bulkhead which would accommodate an A-frame, crane, or similar device for placing logs in the water. A copy of the decision notice for the log transfer facility (LTF) appears in Appendix B.

Because of poor market conditions and the lack of demand of timber sales in 1985, the Cleveland timber sale was deferred.

The Forest Plan was amended in 1985-86. At the same time the timber market in southeast Alaska showed signs of improving. The Cleveland timber sale was listed as a possible project to be offered for sale in 1990 and was renamed the Frosty timber sale. The Forest Service determined that the initial environmental analysis would be supplemented and an Environmental Impact Statement would be prepared for the Frosty sale. The Forest Service also determined that the original EA and DN for the log transfer facility were adequate. The permit needed to use the tidelands for the LTF was obtained and is still in effect.

Analysis Process

Forest Service specialists described the project to the public beginning with public notice in 1983. They followed up with letters, a newspaper article, and personal contacts to identify public issues associated with the proposed project.

More recent inventories and public scoping were conducted to supplement those done in 1983-84 to identify resources and issues. The data was entered into a geographic information system (GIS) that displays sensitive stream zones, important wildlife habitat, timber and soil inventories, and location of proposed harvest units. This data was used to analyze the consequences or effects of each alternative and select the alternative preferred by the Forest Service. Unit and road location cards have been used to document the location of harvest units and roads throughout the life of the project. Resource specialists wrote their concerns on the cards and also recommended how their concerns should be treated. The cards convey the planning intent and help track necessary changes in a project when it moves from the planning stage to on-the-ground action. Inventories, reports, and other pertinent documents are part of the Frosty planning record and are available for public inspection at the Wrangell Ranger District Office in Wrangell, Alaska.

This Draft EIS is tiered to the Forest Plan and the Forest Service's Alaska Regional Guide (November, 1983). Tiering means that the Draft EIS will follow guidance provided in the Forest Plan and the Regional Guide; relevant portions of those documents, and others, have been incorporated into the Draft EIS by reference.

Issues

The first public notice of the project appeared in 1983. Starting in January, 1989, interdisciplinary team (IDT) members corresponded with at least twenty individuals, nine organizations, and four municipal, state, and federal agencies. A notice of intent to prepare an EIS was published in the Federal Register on March 21, 1989. Responses were received from one agency, three organizations, and 11 persons.

The IDT reviewed the public comments and used them to help identify the issues that need to be considered with the proposed timber sale. Alternatives were then designed to address the following issues to varying degrees:

1. **SALE PROFITABILITY** (Issue raised by Alaska Lumber and Pulp Company)
Would a sale in the Frosty study area be profitable to both industry and the government?
2. **VISUAL QUALITY** (Issue raised at meeting of Thoms Place residents)
How will the proposed project affect views as seen from Frosty Bay and Seward Passage, and how can any impacts be minimized?
3. **FISH HABITAT** (Issue raised by Alaska Department of Fish and Game)
How will the proposed project affect water quality and fish habitat, and how can impacts be minimized?
4. **WILDLIFE HABITAT** (Issue raised by Alaska Department of Fish and Game)
How will the proposed project affect Sitka black-tailed deer and marten winter range, black bear denning sites, Vancouver Canada Goose breeding, nesting and rearing areas, and Bald eagles, and how can any impacts be minimized?
5. **FROSTY BAY ANCHORAGE** (Issue raised by a trapper who uses the bay)
How will the proposed project affect protection from wind in the Frosty Bay anchorage, and how can impact be minimized?

Five other resource opportunities were identified during the analysis: (1) the option to harvest additional timber volume with a helicopter system, made economical by favorable market conditions, (2) the development of a fish pass on Frosty Creek which would allow coho salmon and steelhead trout to reach potential fish habitat located above a series of barrier falls, (3) the development of a trail system connecting the Santa Anna Bay area with Anan Bay, (4) the design of a temporary sale administration cabin for use as a recreation cabin after sale activities are completed, and (5) monitoring impact of timber activities on breeding geese, and if necessary, subsequent nesting area enhancement.

Approvals Required From Other Agencies

A number of agencies have provided information for this EIS, including the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the Alaska Department of Natural Resources. The Forest Service also consulted with the State of Alaska through the Department of Governmental Coordination to ensure the project was consistent with the Alaska Coastal Management Plan.

As the lead agency for this environmental compliance action, the Forest Service is responsible for the preparation of the EIS. The Forest Service will make a decision based on the EIS, to be documented in a Record of Decision (ROD). The Forest Service is also responsible for acquiring permits from the U.S. Army Corps of Engineers and the Alaska Department of Environmental Conservation. Each of these agencies will make its own decision about whether to issue the following permits:

U.S. Army Corps of Engineers:

- A single permit from the Corps incorporates requirements for the Clean Water Act and the Rivers and Harbors Act. It also includes U.S. Environmental Protection Agency permits for pollution discharge elimination and spill prevention control and countermeasure. In addition, the Corps permit covers the Alaska Department of Environmental Conservation certificate of reasonable assurance for compliance with Alaska water quality standards. This permit has already been obtained based on the log transfer facility analysis in 1984.

State of Alaska Division of Governmental Coordination:

- A review coordinated by ADGC determines whether the State agencies agree with the Forest Service determination of consistency with the Alaska Coastal Management Plan. The permit for the log transfer facility has already been obtained, as has the State tidelands easement grant for the use of State tidelands.

Chapter 2

Alternatives

Chapter 2

Alternatives

Introduction

This chapter describes alternative methods of providing a short-term timber sale for the independent logging community in the Frosty study area. A number of guidelines were followed in developing the alternatives.

National Environmental Policy Act (NEPA) Sections Included:

1. A description of the process used to formulate the alternatives;
2. A description of the alternatives that were considered but eliminated from detailed study;
3. A description of each alternative studied in detail, including the preferred alternative;
4. A comparison of the alternatives; and
5. The identification of the alternative preferred by the Forest Service.

National Environmental Policy Act (NEPA) Process Used:

1. Determine the scope of the project;
2. Collect and interpret data;
3. Develop alternatives;
4. Estimate effects of alternatives; and
5. Evaluate alternatives and identify a preferred alternative.

Stikine Area Guidelines Followed:

1. Alternatives must be consistent with LUDs designated in the Forest Plan; in this case, for resource development under LUD IV guidelines. These guidelines allow latitude as to when development will occur and the type of development that can be undertaken.
2. The range of alternatives, as a whole, must address public issues, Forest Service management concerns, and management opportunities identified in scoping. Because issues often differ widely, not every alternative can fully address every issue.
3. Alternatives involving timber harvest should harvest the most economic stands available while meeting the objectives of the alternative.
4. There is no need to re-analyze the LTF location decision documented in the August 6, 1984 Decision Notice.

Alternatives Considered but Eliminated from Detailed Study

The Forest Service considered a range of alternatives in order to assess the reasonable alternatives to be studied in detail. Those alternatives eliminated from detailed study, along with the rationale for their dismissal, are as follows:

Cleveland Preferred Alternative

In the Cleveland Decision Notice of 1984, Alternative D was selected as the alternative preferred by the Forest Service. This alternative was not considered in detail in the Frosty EIS because it is no longer consistent with current policy of stream-side management with aquatic habitat management units (AHMUs).

Maximize Timber Harvest

This alternative was not studied in detail because it would harvest virtually all the operable high-volume, old-growth stands. A preliminary economic analysis indicated that the inclusion of certain road sections to harvest isolated timber stands would not make an economically viable timber sale. In addition, it would not allow for retention of wildlife habitat or scenic and recreation values consistent with the Forest Plan. There would be an unacceptable risk of impacts to the fisheries resource because of increased stream crossings and increased harvest within stream-side zones.

Alter Land Use Designations

The Frosty study area must be managed as defined in the Forest Plan, consistent with land-use-designation IV (LUD IV). It is possible to change LUDs in the Forest Plan revision process or by amending the Forest Plan, however, there was no public comment or internal concern suggesting that the LUD be changed.

Partial Cutting

Trees in southeast Alaska are shallow-rooted and susceptible to windthrow. When partial cutting systems are employed, not only are harvested stands subject to increased windthrow, but injury to the residual stand can be significant. Unless there are specific resource concerns or opportunities which would warrant the use of partial cutting, it is not considered a desirable method of harvest.

Alternatives Considered in Detail

The Forest Service developed four alternatives for detailed analysis. In addition, a helicopter option has been added to each action alternative. Each of these provides for protection of resources; each responds to resource management opportunities such as timber harvest, wildlife habitat management, and visual quality management; and each addresses issues the public and management identified in Chapter 1. However each alternative provides a different mix of resource outputs that emphasize different resource values. Each alternative responds to some or all of the issues developed during scoping (see Chapter 1), and each includes a map for reference.

Alternative #1

No Action

No road construction and no timber harvest. Alternative 1 was evaluated to provide baseline information against which other alternatives would be measured. A map of the Frosty study area is shown facing the inside front cover (Map 2-1).

**Common to
Alternatives 2, 3,
and 4**

Some of the major items common to alternatives 2, 3, and 4:

- (a) Harvest was considered only on the 40 percent of the Frosty study area classified as operable forest land and suitable for timber management.
- (b) Helicopter harvest units have been identified and packaged as a "helicopter option" that could be added to each of the action alternatives. If market conditions are favorable and environmental impacts are acceptable, then all or some of the helicopter units will be added to the selected alternative.
- (c) Design includes location of a sortyard near Unit 5 which will be used to store and sort logs prior to assembly into rafts.
- (d) The road system would start from a log transfer facility (LTF) located in Frosty Bay. The LTF and bridges will be temporary structures because they cost less than permanent structures and would not be used for quite some time following the initial entry.
- (e) A floating log camp will be required to reduce land-based impacts.
- (f) Harvest and road construction activities would avoid known cultural sites.
- (g) The harvest and road construction activities would avoid the 330 foot buffer around eagle nest trees.
- (h) Stream protection would include provision of buffer areas and other protective actions consistent with aquatic habitat management unit (AHMU) guidelines pertaining to the following:
 - 1. unstable banks
 - 2. temperature sensitivity
 - 3. large, woody debris for rearing habitat
- (i) Alternatives to the construction of the bridge and road into unit 10A will be considered. If helicopter logging is possible, the need for construction of the road and bridge may be eliminated.
- (j) Boundaries on units have been adjusted to reduce the impact on the view as seen from Frosty Bay.
- (k) The sale administration cabin will be located and designed to serve as a recreation cabin after administration of the sale is completed.



2 Alternatives

Alternative #2

Largest Timber Sale of the Action Alternatives

- 28 MMBF timber
- 1439 acres land
- 14.0 miles specified* road
- 11.0 miles spur** road
- high-lead, cable logging

Of the three action alternatives, this provides the largest timber sale. It is a modification of the alternative selected in the original Cleveland Decision Notice in 1984. Alternative 2 harvests trees along the southwest edge of Frosty Bay and there is some risk that this could allow wind to blow across the Frosty Bay anchorage.

A number of features have been added to the old Cleveland preferred alternative in order to address concerns that have arisen during the past five years. These features include the items listed on the previous page under "common to alternatives 2 through 4."

Two units exceed the 100-acre maximum clearcut size specified in the National Forest Management Act (NFMA) regulations. If the helicopter option were added to Alternative 2 there would be six units exceeding the 100-acre size limit described in the National Forest Management Act. Five of the larger units, however, are less than 150 acres, the maximum size that can be approved by a Forest Supervisor. The larger units were designed to improve the economics of the sale and to take advantage of natural features to reduce the chance that surrounding trees would be blown down after the unit is harvested. One of the units would be 230 acres and would require approval by the Regional Forester.

For the purposes of cumulative effects analysis, the harvest scenario assumes that a second entry would remove the remaining economical volume in 50 years.

Map 2-2 displays the unit locations, LTF, and specified road system as designed. The spur roads are not displayed because their locations may change, with Forest Service approval, according to operator needs and equipment requirements.

Alternative #3

Larger Timber Sale than Alternative 2, Smaller Timber Sale than Alternative 4.

- 22 MMBF timber
- 1133 acres land
- 14.0 miles specified road
- 7.4 miles spur road
- high-lead, cable logging

* The location of the road and the construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

** Spur roads are usually less than 1/2 mile long. The location is selected by the contractor and approved by the Forest Service. Spur roads are sometimes referred to as temporary or non-system roads.

This alternative provides for less timber than Alternative 2 and more than Alternative 4. Compared to Alternative 2, it reduces the risk of allowing wind to sweep across the Frosty Bay anchorage and reduces the impact on views as seen from Frosty Bay and Seward Passage. In addition to resource protection described in Alternative 2, Alternative 3 includes the following features:

1. All of Unit 4 and portions of Units 9, 10, and 11 would be left standing to reduce impact on Canada goose and deer habitat.
2. A portion of unit 3 would be left standing to protect the Frosty Bay anchorage from wind and to further protect the view as seen from Frosty Bay and Seward Passage. This modification would also retain additional old growth habitat for deer winter range.
3. Boundaries for Units 1,2,7, and 8 would be modified to reduce impact on views as seen from Seward Passage.
4. If the helicopter option was added to Alternative 3 there would be four units exceeding the 100-acre size limit described in the National Forest Management Act. Each of the larger units, however, is less than 150 acres, the maximum size that can be approved by a Forest Supervisor.

The harvest scenario assumes second entry in 30 years to take one-third remaining volume, third entry in 60 years to take second one-third, fourth entry in 90 years to take final one-third.

Map 2-3 displays the unit locations, LTF, and specified road system as designed. The spur roads are not displayed because their locations may change, with Forest Service approval, according to operator needs and equipment requirements. The spur road mileage listed is an estimate of the amount of road that a prudent operator may require.

Alternative #4

Smallest Timber Sale of the Action Alternatives

- 17 MMBF timber
- 862 acres land
- 11.6 miles specified road
- 5.7 miles spur road
- high-lead cable logging

This alternative provides for less timber harvest than Alternatives 2 or 3. It also has less impact on wildlife habitat and on views as seen from Seward Passage. In addition to resource protection described in Alternative 3, Alternative 4 provides the following features:

1. Unit 10-A would be left standing for bear denning as requested by Alaska Department of Fish and Game.

2. The north half of Unit 14 is left standing to keep the south-facing slope available for deer habitat and to avoid stream crossing.
3. Units 1 and 2 are left standing to protect the view as seen from Seward Passage.

If the helicopter option were added to Alternative 4 there would be four units exceeding the 100-acre size limit described in the National Forest Management Act. Each of the larger units, however, is less than 150 acres, the maximum size that can be approved by a Forest Supervisor.

For the purposes of cumulative effects analysis, the projected harvest scenario is the same as in Alternative 3: assumes second entry in 30 years to harvest one-third of the remaining volume, third entry in 60 years to harvest second one-third, and fourth entry in 90 years to harvest final one-third.

Map 2-4 displays the unit locations, LTF, and specified road system as designed. The spur roads are not displayed because their locations may change, with Forest Service approval, according to operator needs and equipment requirements.

Helicopter Option

Additional Volume To Meet Forest Plan Objective to Harvest Less-Economical Areas When Possible. Available Due to Favorable Market.

- 12.0 MMBF timber
- 574 acres land
- no specified road
- no spur road
- full suspension, helicopter logging

Under normal market conditions helicopter units would not be economical to harvest. Helicopter logging was considered in each of the Frosty action alternatives in order to meet a Forest Plan objective to harvest less-economical areas when possible. This opportunity is available now because improved market conditions make the units more economically attractive (see Figure 2-5 for location of helicopter units).

Helicopter units are described as an option because some or all of the 574 acres could be added to each of the action alternatives. Helicopter units adjacent to units 13A, 13B, 14B, and 18 would make the size of these units greater than 100 acres in each action alternative.

If it is possible to add helicopter units, then it may be possible to eliminate the bridge crossing and road to units 4 and 10A. This will reduce ground disturbance created by road construction and further protect the stream zone along Frosty Creek.

There would be no need to construct additional road. If helicopter units are found to be on high-hazard soils and this impact cannot be mitigated, they will be dropped from consideration.

Helicopter logging would normally be too expensive to be economical in the Frosty area, however the cost of this volume would be averaged along with the less-expensive high-lead volume. If the helicopter units were deferred and sold separately at a later date, market conditions may not be the same and amortization of costs over more volume would not be possible. Roads and bridges would also have to be re-installed.

Summary of the Comparison of Alternatives

Each alternative is presented for comparison in Table 2-1 below. A detailed analysis of the environmental consequences or impacts of each alternative appears in Chapter 4.

Table 2-1. Summary of Alternatives

ELEMENT OF PROPOSAL	ALT 1	ALT 2	ALT 3	ALT 4	HELI
TIMBER HARVEST					
Total Volume* (MMBF)	0	28	22	17	12
Harvest Acres	0	1439	1133	862	574
Percent Harvested of:					
Total Commercial Forest Land (CFL) (out of 9882 acres)	0%	15%	11%	9%	6%
Operable CFL (out of 7341 acres)	0%	19%	15%	12%	8%
Normal CFL (can be harvested with standard cable logging systems) (out of 3230 acres)	0%	45%	35%	27%	0%
Non-Standard CFL (requires heli- copter, balloon, long-span, etc.)(out of 4201 acres)	0%	0%	0%	0%	14%
Units over 100 acres	0	2	0	0	4
Percent Harvest by Volume Class					
4: 8-20,000 BF/acre	0%	37%	39%	41%	39%
5: 20-30,000 BF/acre	0%	48%	47%	41%	39%
6: 30-50,000 BF/acre	0%	15%	14%	18%	22%
	0%	100%	100%	100%	100%
ROAD CONSTRUCTION					
Miles of Specified Road Construction	0	14.0	14.0	11.6	0
Miles of Spur Road Construction	0	11.0	7.4	5.7	0

* Volume estimates are taken from a computer database and are considered to be conservative. Actual volume may prove to be higher when the units are cruised on the ground.

Identification of the Forest Service Preferred Alternative

On September 15, 1989, the Frosty IDT met with the Forest Supervisor and staff officers to select the alternative preferred by the Forest Service. The group decided to consider the addition of helicopter units to take advantage of favorable market conditions. Prices are currently high enough to make such a sale economical. An analysis of the helicopter units shows that most of the units would be viable additions. The impacts associated with them should be less than the high-lead units because there would be no additional road construction associated with the helicopter units, and because helicopter yarding fully suspends the logs off the ground. If they are not harvested at this time a second opportunity may not be available any time soon. The helicopter units were then added to the environmental analysis as an option to each action alternative. Some or all of the helicopter units would be selected for harvest based on resource impacts and economic considerations.

After reviewing all resource impacts, consequences, and opportunities, Alternative 3 was identified as the preferred alternative. The helicopter option was also recommended along with Alternative 3. This package provides the greatest volume of harvest along with resource protection measures that are adequate under the management constraints for a LUD IV area.

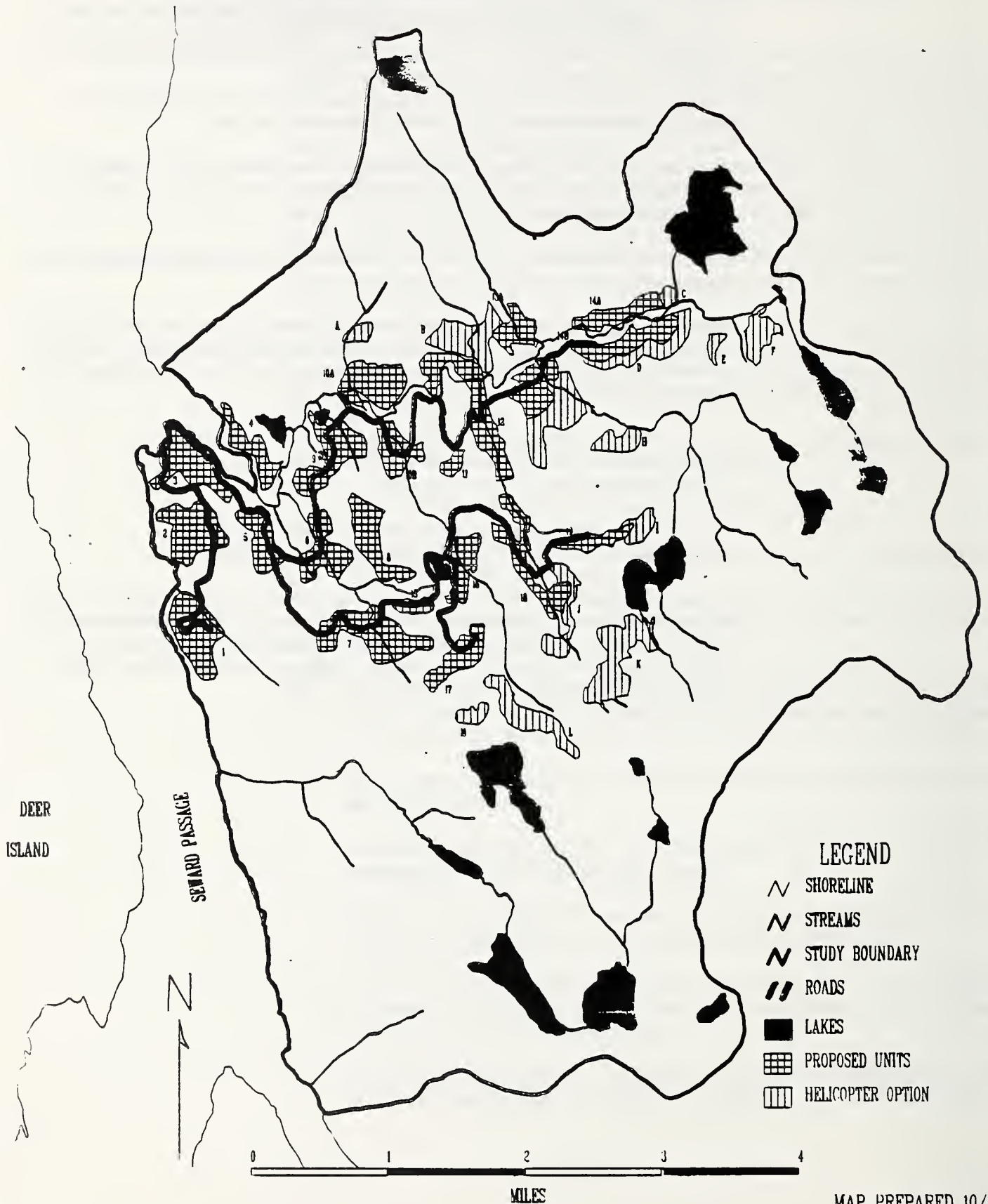
For the purposes of timber sale contract preparation, the mitigation measures suggested with Alternative 3 and the helicopter option are:

- (a) The contractor will be required to provide a floating camp.
- (b) A sortyard, if required, will be located near Unit 5, away from Frosty Bay, for sorting logs prior to placement in water.
- (c) The log transfer facility and bridges will be temporary structures and will be removed following sale activities.
- (d) The Forest Service administrative facility will be designed for use as a recreational cabin once administration has been completed. Landscape design principles will be used in design of the original structure in order to meet future recreation use.
- (e) The sale area improvement plan, funded by Knudson-Vandenberg (KV) timber sale receipts, will include:
 - 1. Probable construction of a fish pass over the first barrier falls in Frosty Creek, contingent on future environmental analysis.
 - 2. Studies will be conducted to evaluate the impacts associated with timber harvest activities on breeding Vancouver Canada geese within the sale area.
- (f) 330-foot buffers will be established around eagle nest trees. Cultural sites will be protected. If additional sites or trees are discovered once the sale is in operation, protection measures will be put in place.
- (g) Aquatic Habitat Management Unit (AHMU) guidelines will be followed for timber harvest and road construction near Class 1, Class 2, and Class 3 streams.

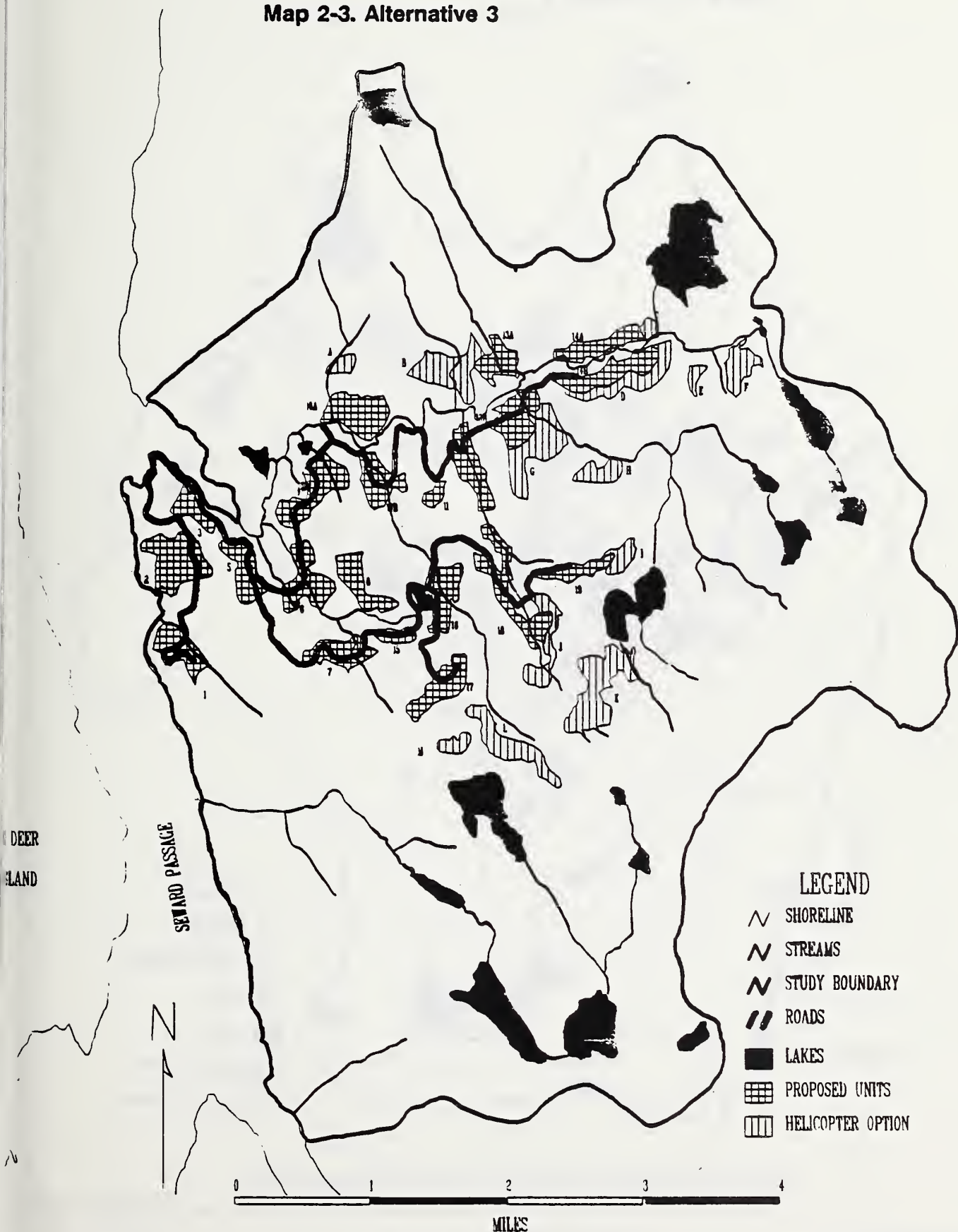
- (h) The visual resource will be protected to the extent required to meet the visual quality objectives for the Frosty area. Landscape design principles will be used in the design and rehabilitation of the log transfer facility, rock pits, and spur roads. (See Appendix C for details on treatment of the rock pit near the log transfer facility.)
- (i) The resource protection standards for helicopter units will be consistent with protection established for the preferred alternative in this EIS.
- (j) There are a number of options for the design of two crossings over Frosty Creek. Protection of stream banks and stream habitat will be considered in choosing one of the following options:
 1. **Eliminate need for crossings.** One or both crossings may be eliminated if helicopter logging is used.
 2. **Construct bridges.** The first crossing, providing access to unit 10A, would require a bridge span of at least 80 feet. Bridge stringers of such length may be difficult to find in the Frosty area, so if a bridge were constructed, it could be done in one of the following ways:
 - The Forest Service would buy a portable bridge for this site. After use, it would be moved and used on another sale or site. Estimated cost of the bridge would be \$90,000.
 - A bridge would be constructed using a center pier. The pier would be removed after logging in unit 10 is completed.
 3. **Construct "fords."** Construct a drive-across surface of rock that would allow water to run over the crossing. After the logging is completed, the rocks would be removed and the site restored. Estimated cost for constructing a ford is approximately \$1100. If this crossing option were selected, mitigation measures would include timing of construction and timing of use.

2 Alternatives

Map 2-2. Alternative 2

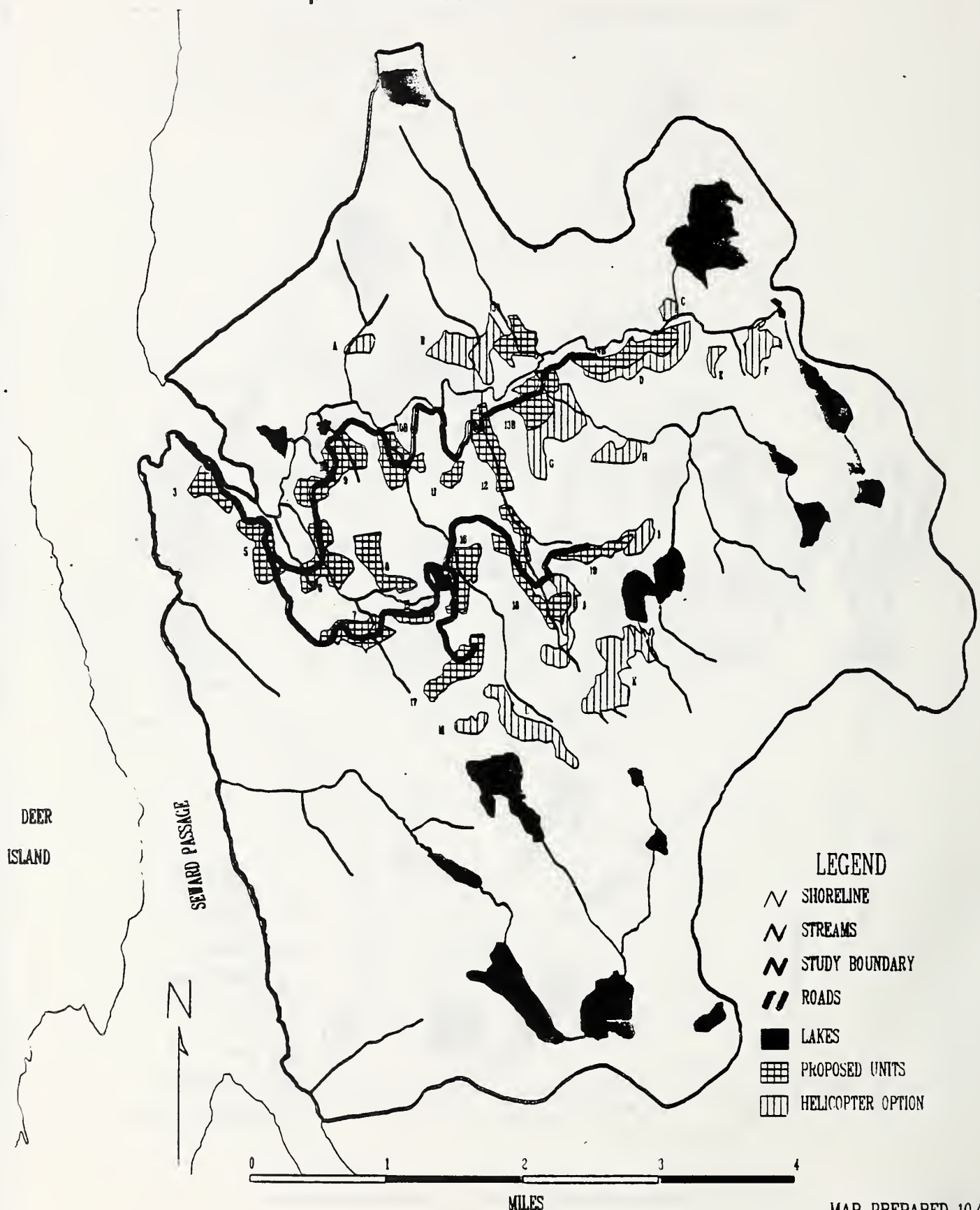


Map 2-3. Alternative 3



2 Alternatives

Map 2-4. Alternative 4



MAP PREPARED 10/25/89

By Ljeffries

Map 2-5. Helicopter Option

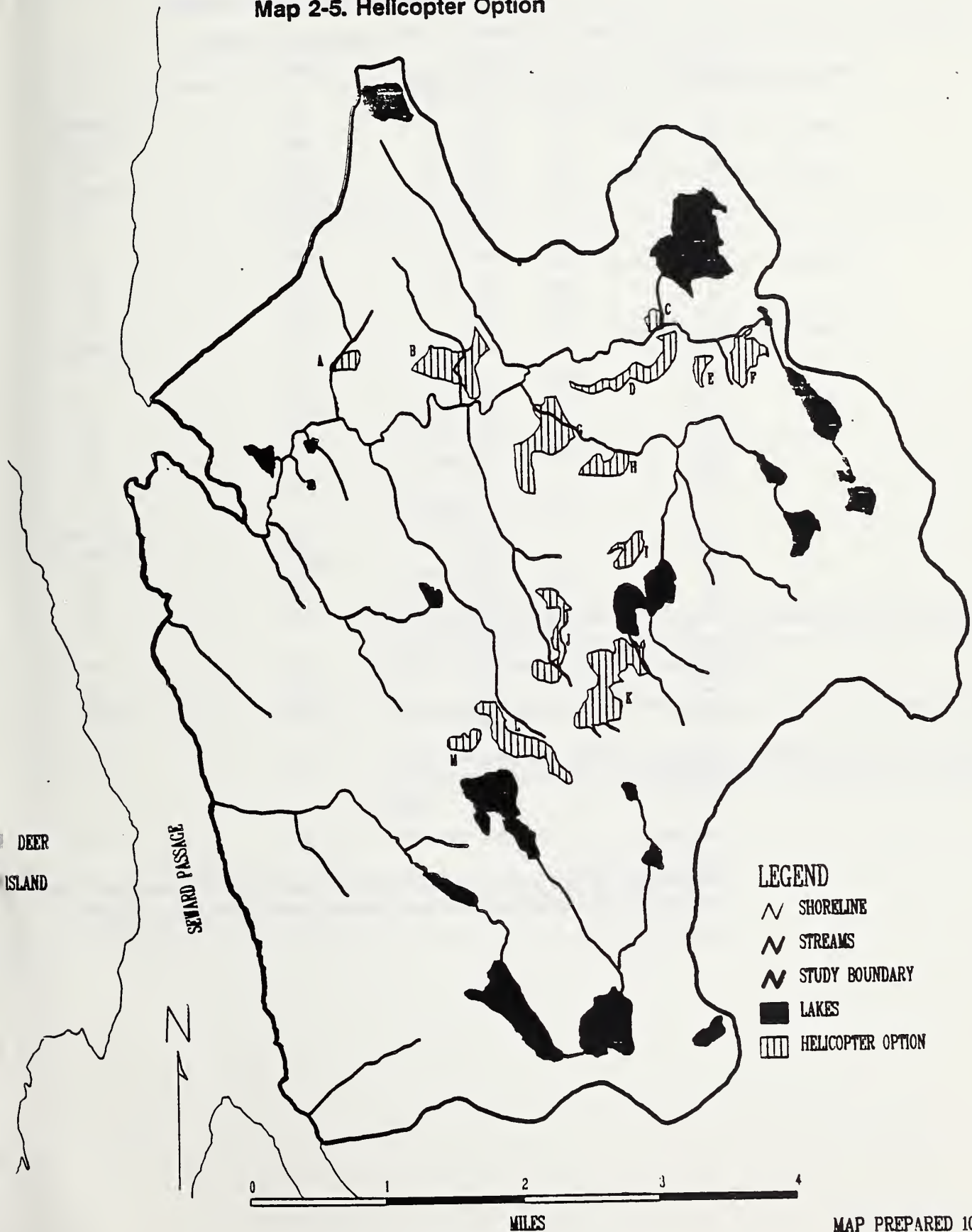


Table 2-2. Harvest Units in Each Alternative.

Unit	NUMBER OF ACRES		
	Alt 2	Alt 3	Alt 4
1	97	53	deleted
2	93	93	deleted
3	90	34	34
4	49	deleted	deleted
5	54	54	54
6	69	69	69
7	117	51	51
8	73	49	49
9	88	81	81
10A	83	75	deleted
10B	52	52	52
11	13	13	13
12	112	60	60
13A	41	41	41
13B	61	61	61
14A	50	50	deleted
14B	65	65	65
15	18	18	18
16	50	50	50
17	57	57	57
18	78	78	78
19	30	30	30
Total	1439	1133	862
Volume* (mmbf)	28.0	21.6	16.6
mbf/acre	19.5	19.1	19.3

* Timber volumes are based on a computer database and are considered to be conservative. Volume estimates from an on-the-ground cruise may be higher.

Table 2-3. Helicopter Units to be added to each Action Alternative.

UNIT		NUMBER OF ACRES
A	15	
B	77 ¹	(plus Unit 13A = 118 acres) ²
C	11	
D	53	(plus Unit 14B = 118 acres) ²
E	11	
F	38	
G	85	(plus Unit 13B = 146 acres) ²
H	28	
I	23	
J	45	(plus Unit 18 = 123 acres) ²
K	105	
L	67	
M	16	
Total	574	
Volume ³ (mmbf)	12.1	
mbf/acre	21.2	

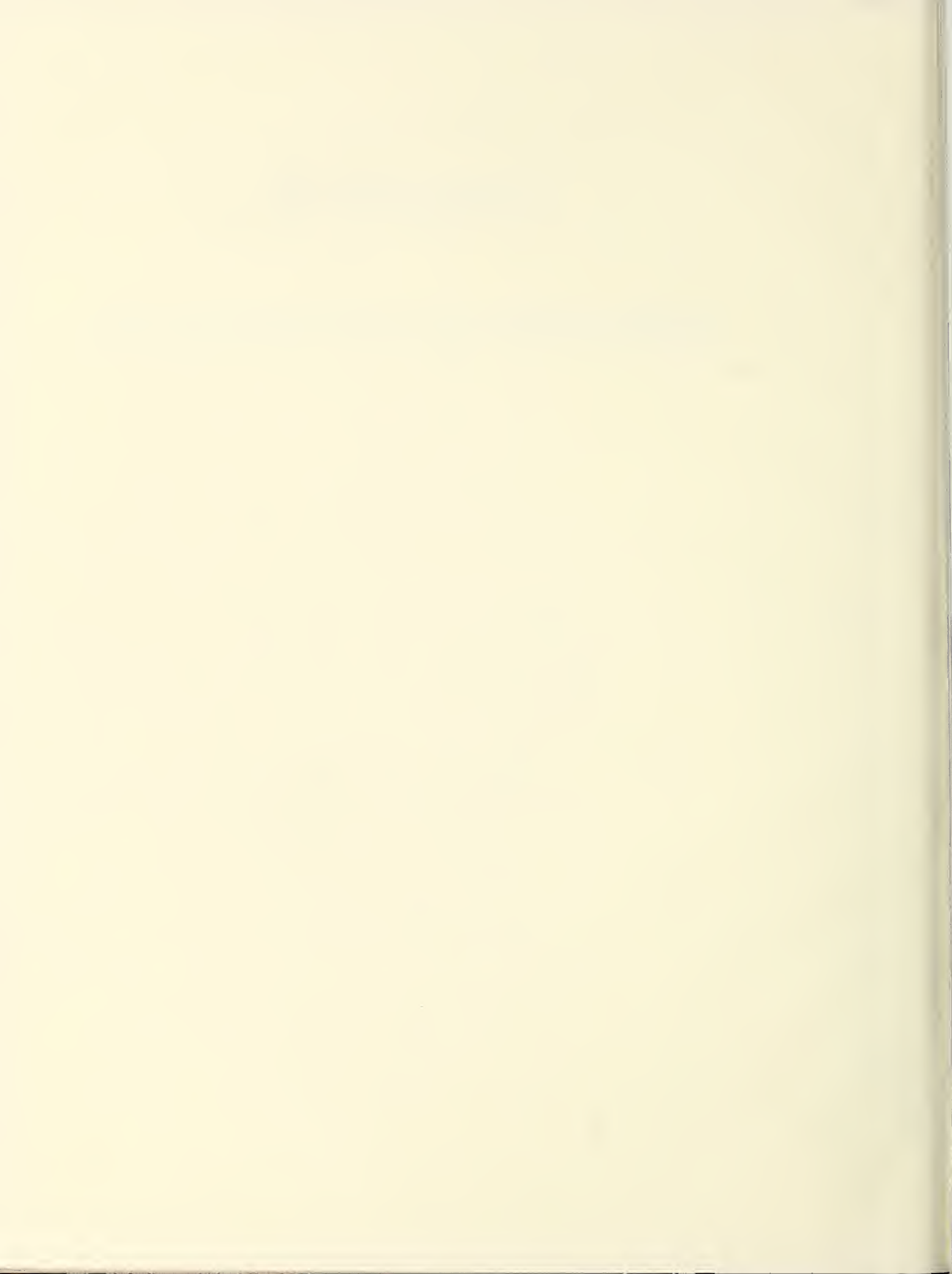
¹ In Alternative 2, helicopter Unit B would be combined with conventional Units 12 and 13A for a total of 230 acres. Clearcuts larger than 150 acres must be authorized by the Regional Forester.

² Units greater than 100 acres in size must be approved by the Forest Supervisor.

³ Timber volumes are based on a computer database and are considered to be conservative. Volume estimates from an on-the-ground cruise may be higher.

Chapter 3

Affected Environment



Chapter 3

Affected Environment

Introduction

This chapter describes the environment of the the Frosty Study Area that would affect, or be affected by, any of the proposed alternatives. The information has been taken from more detailed reports that are available for public review in the planning record, located on the Wrangell Ranger District, Wrangell, Alaska.

Resources

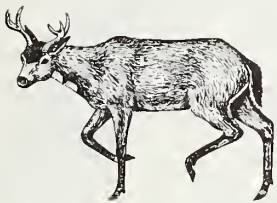
Wildlife

The Frosty area supports a variety of wildlife common to Southeast Alaska, including:

- Sitka blacktail deer
- Marten
- Vancouver Canada goose
- Black bear
- Bald eagle

The first four are important species for subsistence use, commercial trapping, and sport hunting, and are indicator species for old growth habitat. Bald eagles are described because there are eagle nests within the area. Brown bear use the area only occasionally and are not discussed in this document. There are no known threatened or endangered wildlife species within the area.

Sitka Black-tailed Deer



The Sitka black-tail are small deer that are common in southeast Alaska. During moderate to severe winters, they depend on high volume old-growth forest for survival.

A habitat suitability model indicates that, under existing habitat conditions, the Frosty area can support up to 830 deer during a mild winter, 365 during a moderate winter, and 139 during a severe winter. According to the model, an optimum winter habitat for deer, without predation, will support 125 deer per square mile during a mild winter, or a total of 2063 deer for an optimum area of this size. The Frosty area values are comparatively low due to the large percentage of muskeg and scrub timber that is of marginal value as winter habitat, and due to the presence of wolves. The deer probably receive very little hunting pressure. Map 3-1 displays the deer winter range.

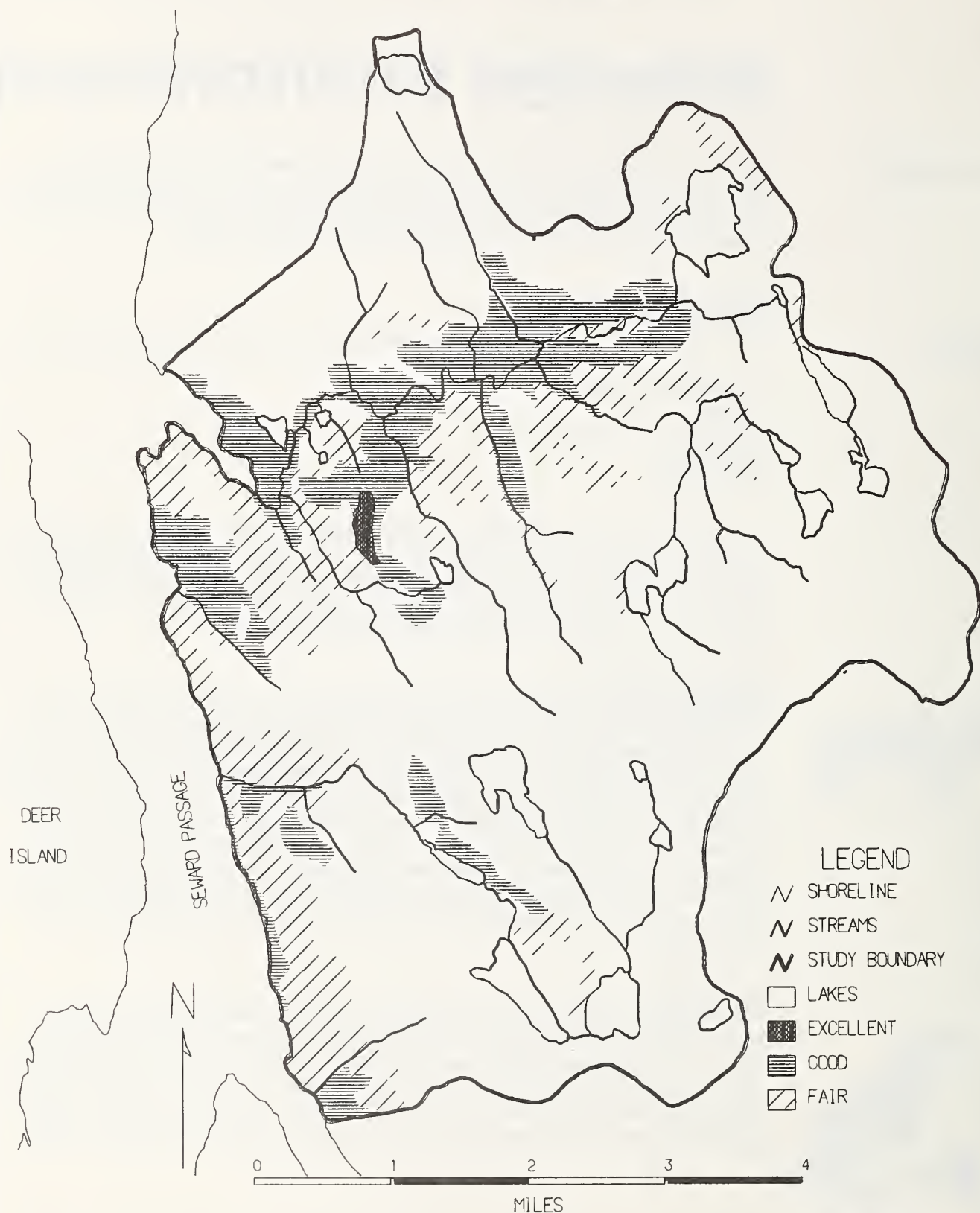
Pine Marten



Marten habitat is defined as lands along the beach and estuary fringes, upland forest, and subalpine habitats. Snags and fallen trees provide dens for marten and cover for prey species (Pelikan and Vackar 1978, Spencer 1981). Approximately 12 marten are harvested from the Frosty area each winter, according to state hunting and trapping records over the past five years. Population levels are unknown; however, estimates based on this harvest level indicate that the area can sustain 36 marten.

3 Affected Environment

Map 3-1. Deer Winter Range



Vancouver Canada Goose

There are few areas on the Tongass National Forest where geese are found nesting in high densities; however, a few high-density nesting sites have been found. Three sites have been identified on the Wrangell Ranger District and one of them is on the Frosty study area.

Unlike other Canada geese which nest primarily in wetlands, the geese in the Frosty area nest primarily in forested areas, near open water but often as far as ½ mile away. Nests can be on the ground, on rootwads of wind-thrown trees, or on top of broken off snags. Most nests are found in or adjacent to old growth timber from riparian spruce stands to scrub-muskeg shore pine. High density goose nesting areas are shown on Map 3-2.

Within the study area, adults and goslings feed in heavy timber, around the edges of muskegs, along the edges of ponds, lakes, and streams. They feed on skunk cabbage, blueberry (*Vaccinium* sp.), grass, and other forbs. Goslings flee into heavy timber and brush when threatened by predators and are usually not found far from cover.

Black Bear

The Frosty area receives only light to moderate bear use because of small anadromous fish runs and marginal habitat conditions. One of the first foods emerging bears seek in the spring is grass, which is most often found along the beaches. Most of the shoreline in the Frosty Sale area is steep and rocky, with only limited patches of beach grass. Most bears denning in this area would have to go to Anan or the Santa Anna Inlet/Sunny Bay area to find sufficient grass in the spring.

Most black bears use large logs and hollow, standing trees found in high volume old-growth forests for denning rather than digging dens in the ground. It is unlikely that large numbers of bears den in the Frosty area because there is abundant old growth present in areas of better habitat nearby. It is possible that some of the bears from Anan Creek use the old growth stands in the Frosty Sale Area for winter dens.

Bald Eagle

Bald eagles nest almost exclusively within 500 feet of the beach in large, old-growth trees capable of supporting nests which may be up to ten feet in diameter. Eagles perch in large trees and snags located along beaches, major streams, and estuaries.

There are five known bald eagle nest sites in the study area but only three are near proposed harvest areas and will require protection measures (see Map 3-2). None of the nests were active in 1989. A sixth nest was reported on the west shore of Frosty Bay approximately one mile south of the tip of the peninsula, but the sighting could not be confirmed.

Pink salmon spawn in the lower ¼ mile of Frosty Creek. There have been very few counts in this stream in recent years, but average runs appear to be 500 to 1000 fish, with a range from 100 to 3000.

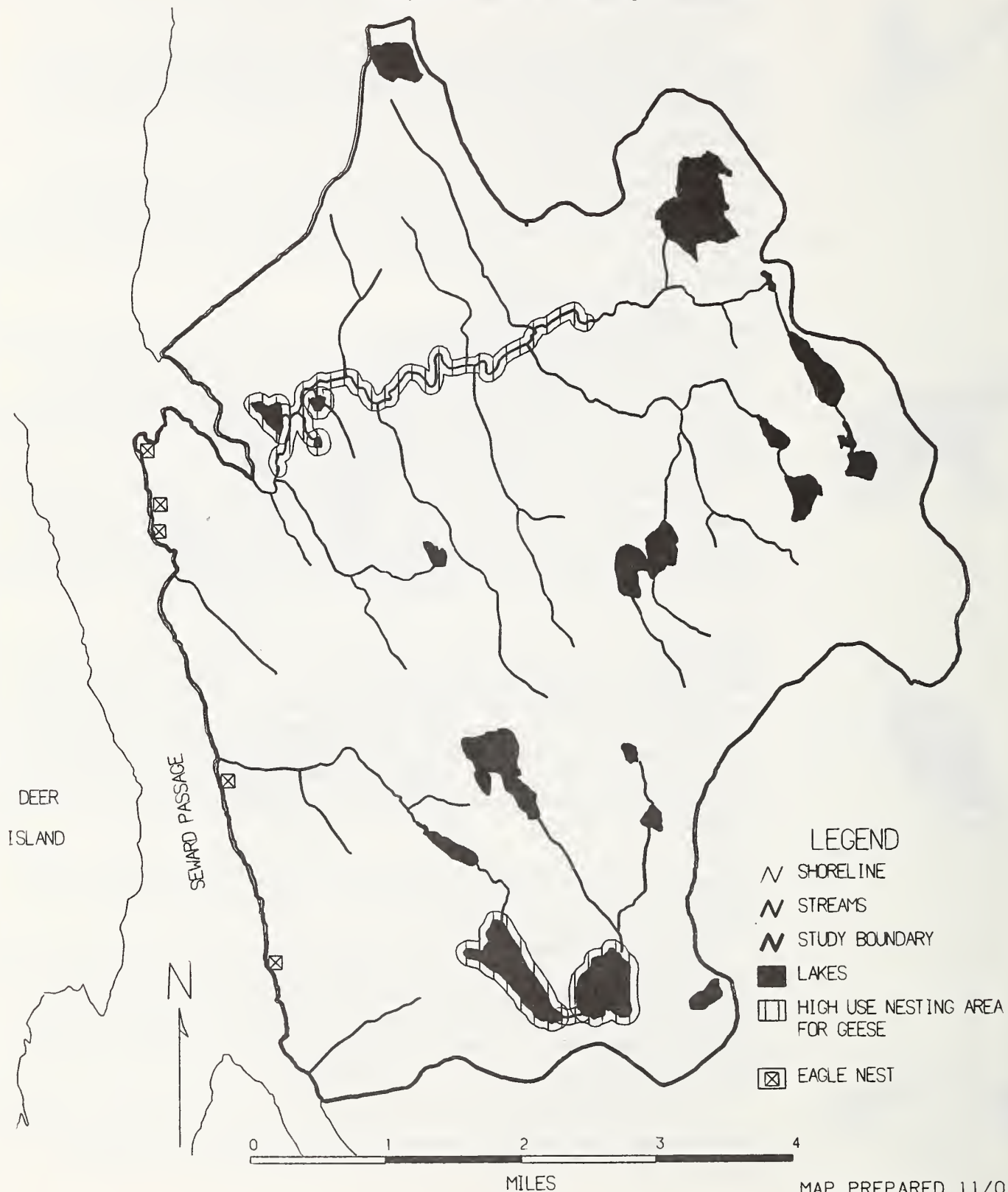
There are four barrier falls in Frosty Creek within the first ¾ mile (see Map 3-3). The first falls, ¼ mile from salt water, is a total barrier to pink and chum salmon and may also be a barrier to coho salmon and steelhead trout. No anadromous fish have ever been observed or captured above this falls. Approximately ½ mile above this falls are two more vertical falls which are total barriers to all salmonids. Fish pass structures could move fish over these vertical falls but not over another barrier falls two miles upstream.

There is a good population of cutthroat trout known to occur above and below these falls and they should also be present in suitable habitat in the major tributaries, lakes, and ponds. There is very little sport fishing in Frosty Creek at this time.



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Map 3-2. Goose and Eagle Habitat



If coho salmon and steelhead trout could pass these first three falls, they could reach approximately six acres of stream rearing habitat and 26 acres of pond and small lake habitat. The additional habitat is capable of producing an estimated 3000 coho per year for the commercial fisheries or a comparable number of steelhead trout for sport fisheries, or some combination of both.

The lower reach of Frosty Creek is mostly bedrock-controlled and very stable. The middle reaches of mainstem Frosty Creek are moderately unstable and, for the most part, highly dependant on the streamside trees for channel stability and logs for fish habitat. Because of the low gradients and low flushing rates, these reaches of the creek are vulnerable to long-term degradation of salmonid spawning habitat and over-wintering habitat if sediment loads were significantly increased or if the amount of large woody debris was significantly decreased.

Frosty Creek might be sensitive to changes in temperature because of its wide, slow-moving channel, and because of the presence of many muskegs and beaver ponds. However, temperature related to fish kills has not been documented in this drainage.

Subsistence

In late 1987 and early 1988, a study was started in Southeast Alaska to document the hunting, fishing and gathering activities of its residents. Although these uses are now documented and mapped, they have not yet been validated by subsistence users and are therefore not available for use in this document.

The "Wrangell Harvest Study," (Cohen, 1989) reported various uses in the Frosty Bay area for hunting, trapping and fishing. This report did not define the numbers of individuals using the area or quantity of materials used or harvested. Use of the area seems to be limited to a few individuals. It is not noted locally for its hunting success. The Wrangell Ranger District has not issued free-use permits for any timber products nor has the Alaska Fish and Game Department issued subsistence or personal use permits for fish in this area.

Hunting and Trapping

Wildlife in the study area are managed by the Alaska Department of Fish and Game. Hunting is allowed during open seasons on black and brown bear, Sitka blacktail deer, moose, and mountain goat. Although a limited amount of hunting takes place for all these species, the study area is not known locally as "the place to go" for hunting success. Deer appear to receive the greatest attention. The value of this particular opportunity to those who use it is probably very high.

The trapping of furbearers, mostly mink, marten, and wolf, occurs along the saltwater beach fringe and along the creeks. State hunting and trapping records indicate that an average of 12 marten are trapped from a portion of the study area each year.

Recreation

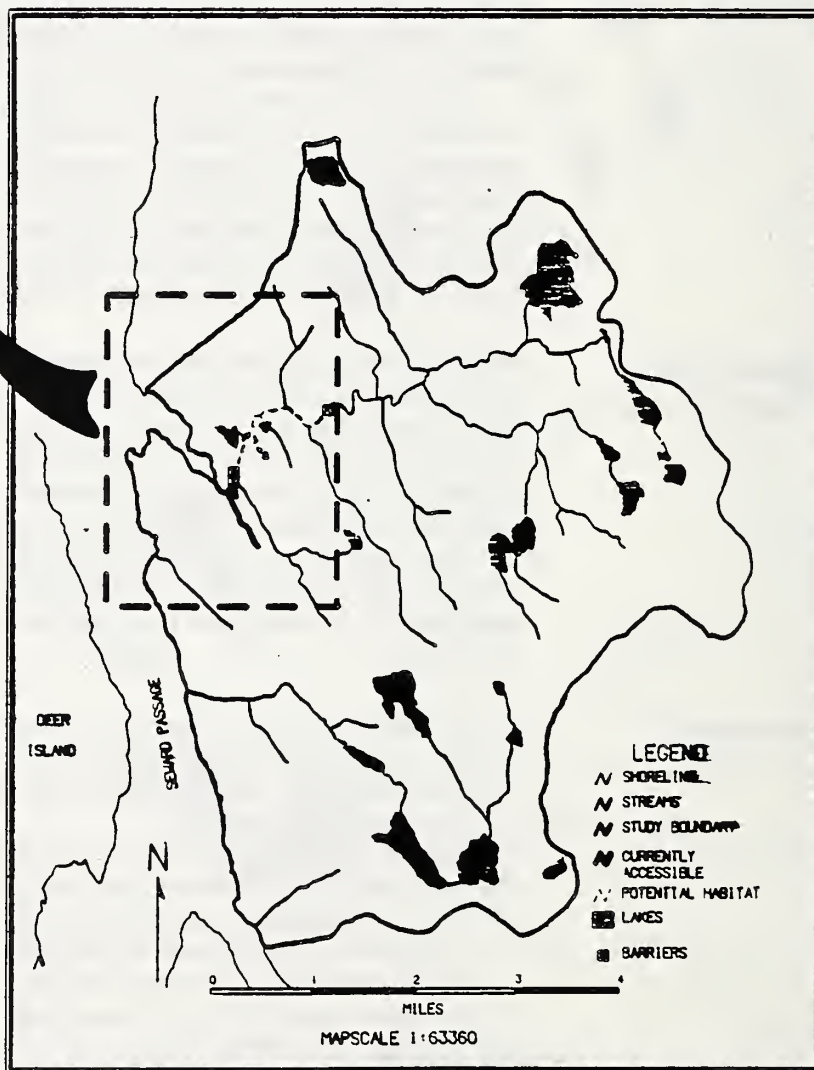
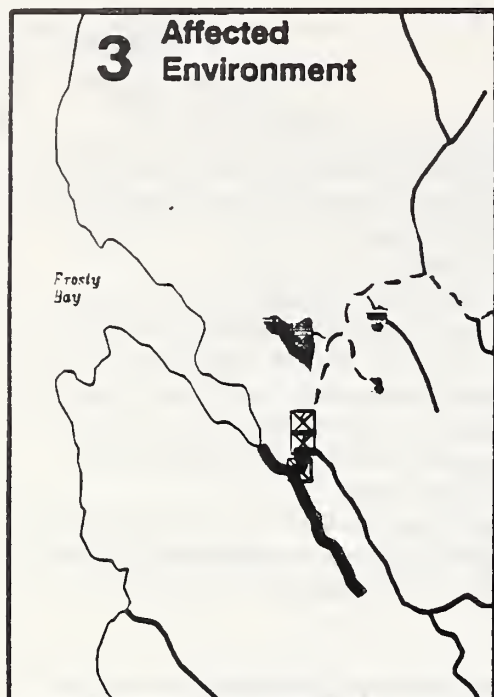
Historically, most users of the study area have been residents of Wrangell, Thoms Place, Myers Chuck and Ketchikan. The most significant use of the area is the anchorage in Frosty Bay, which provides protection from storms for both commercial and recreational vessels.

Use of the area is estimated to be light (less than 100 Recreation Visitor Days per year) because it is distant from population centers, and because the character of the area is overshadowed by the presence of more attractive areas, including Anan Creek and Point Warde to the north and Santa Anna Inlet to the south.

Most uses occur in saltwater, along the beach, and for a short distance up Frosty Creek. There is also some recreation associated with inland lakes for fishing and trapping, but use of the uplands is light.

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Map 3-3. Barrier Falls in Frosty Creek



LEGEND

- ~ SHORELINE
- ~ STREAMS
- ~ STUDY BOUNDARY
- ~ CURRENTLY ACCESSIBLE
- - - POTENTIAL HABITAT
- LAKES
- ⊠ BARRIERS

LEGEND

- ~ SHORELINE
- ~ STREAMS
- ~ STUDY BOUNDARY
- ~ CURRENTLY ACCESSIBLE
- - - POTENTIAL HABITAT
- LAKES
- ⊠ BARRIERS

There are no recreation facilities in the study area. The nearest recreation development is a cabin and a bear and salmon observatory on Anan Creek. Nearby Santa Anna Inlet is visited by small cruiseships during the summer months. These vessels are likely to use Seward Passage and travel by Frosty Bay on the way to Anan or Zimovia Strait.

The Frosty area is currently unroaded and therefore provides recreation opportunity values for solitude. Although there are no roads to the larger lakes within the area, some are accessible by floatplane.

Opportunities

There are a number of opportunities for developing new recreational experiences in the area:

1. The anadromous fish habitat in Frosty Creek is limited by three barrier falls that prevent fish from reaching suitable habitat located further upstream. The construction of fish passes over these barrier falls could improve recreational fishing and may attract more use.
2. The Forest Service would need an administrative cabin in the Frosty Bay area. This facility could be designed to serve as a recreation cabin after timber harvest activities are completed.
3. The road system would not connect to any other road system. However, it could be used as the basis for a trail system in the area. Trails could connect Anan Bay to Santa Anna Bay and cross the Cleveland Peninsula to Yes Bay and Lake McDonald on the Ketchikan Area.

Cultural

A literature search has revealed little cultural data concerning the Frosty Bay area. Goldschmidt and Haas (1946) note the presence of several seasonal camps and dwellings in the Frosty Bay area. Frosty Bay has been specifically noted as having been used for fishing and trapping.

Since 1983, several limited ground surveys have been conducted in the general area. These surveys have been documented and the information reported to the State Historic Preservation Officer. The Frosty Bay area has a high incidence of axe-cut, notched and stripped cedar. Two historical archaeological sites are recorded within the Frosty VCU. It is also known that a number of historic fishing sites exist in the general vicinity on the Cleveland Peninsula. It is quite probable that future surveys conducted in conjunction with site-specific projects may locate additional sites.

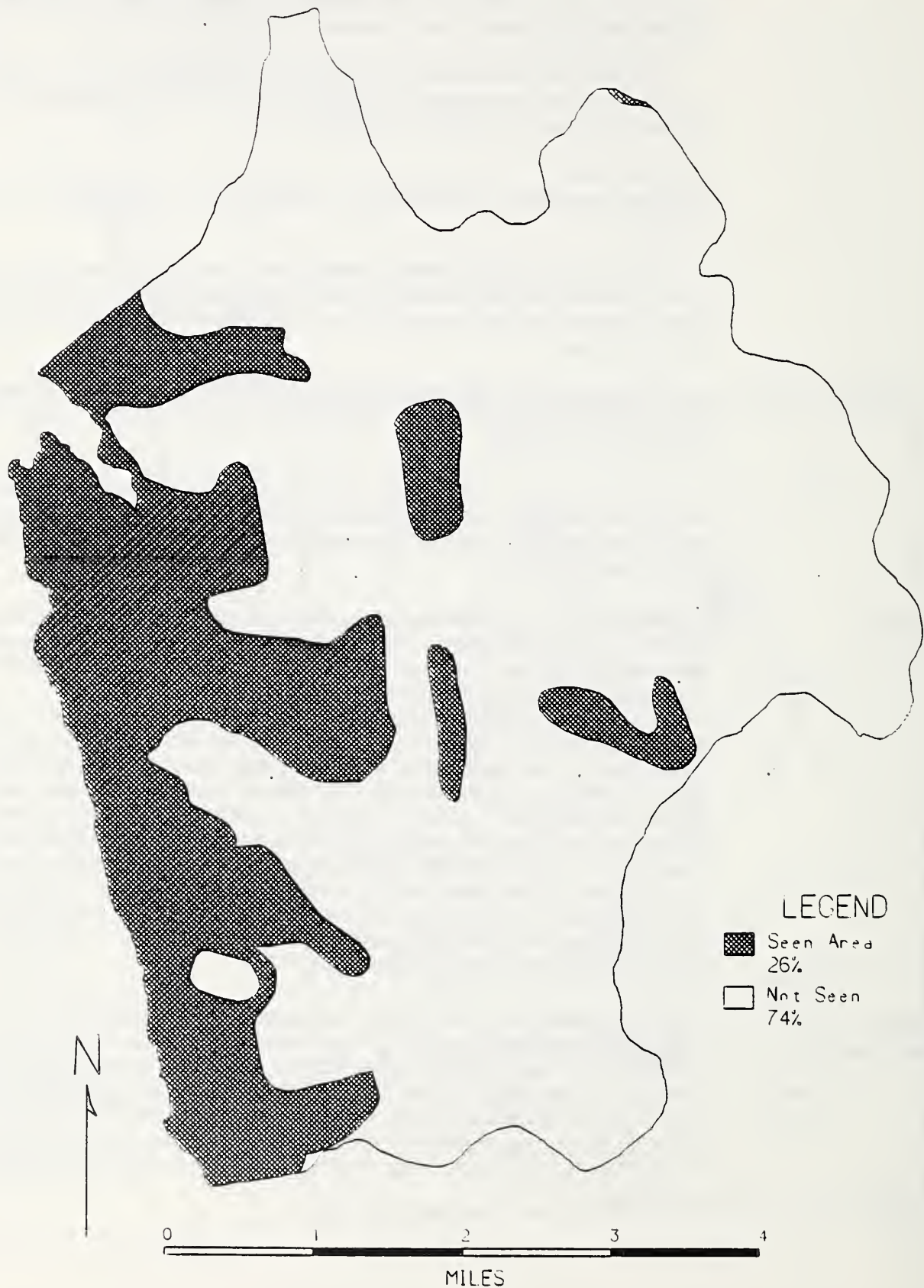
Protection and/or mitigation of cultural resources situated on Federal lands is required by various Federal laws and regulations including the Antiquities Act of 1906, the National Historic Preservation Act of 1966, Executive Order 11593, and the Archeological Resources Protection Act of 1979.

Visual Resource

The Frosty area is part of the Coastal Range landscape character type, characterized by rocky high-elevation mountains, deep valleys, glaciers, ice fields, large rivers and deep fiords ("Visual Character Types," R10-63, May 1979). The landscape in the study area is rated Variety Class C, indicating a low level of landscape diversity for the Coastal Range character type. The terrain adjacent to the mouth and headwaters of Frosty Bay rises gradually from saltwater. South of Frosty Bay the terrain becomes steep and uniformly timbered near saltwater. Inland, the topography is irregular and

3 Affected Environment

Map 3-4. Seen and Non-Seen Area within the Frosty Study Area.



hummocky, and muskegs are interspersed with steep timbered hillsides. Numerous lakes are present. Frosty Bay and the small coves adjacent to Seward Passage add interest to the area seen from saltwater. Existing clearcuts are obvious near the mouth of Frosty Bay.

Approximately 74 percent of the Frosty area is not seen from a sensitive travel route. The remaining 26 percent is viewed from Seward Passage and Frosty Bay, moderately sensitive travel routes (see Map 3-4). Sensitivity levels are a measure of viewer interest in the scenic qualities of the landscape along a particular travel route. Seward Passage and Frosty Bay receive use by commercial fishing vessels and small recreational boats. Seward Passage is occasionally used by cruise vessels and is an alternate ferry route.

Visual Quality Objectives (VQOs) are standards for visual quality that reflect the varying degrees to which a landscape may be modified. The standards are based on the character of the natural landscape and public concern for scenic quality. For example, in areas of high scenic quality and high viewer interest, an inventory VQO of "Retention" would suggest managing for little or no visible change in the landscape. "Inventory" VQOs are objectives reflecting the visual resource concerns in a given area. However, they may or may not be met by the alternative selected. Selection of the alternative would include the decision of whether or not to meet inventory VQOs. Inventory VQOs for the Frosty area include the following categories shown in Map 3-5:

- **Modification and Maximum Modification in areas not normally seen.** In areas of Maximum Modification, "man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background"
- **Modification in the areas seen from sensitive travel routes.** In areas of Modification, "man's activity may dominate the characteristic landscape but must utilize naturally established form, line, color and texture. It should appear as a natural occurrence when viewed in the foreground or middleground" (National Forest Landscape Management, Vol. 2).
- **Partial Retention in small portions of the seen area not affected by the proposed sale.** In areas of Partial Retention, "man's activity may be evident but must remain visually subordinate to the characteristic landscape."

Conceptual Examples VQO's



Partial Retention



Modification



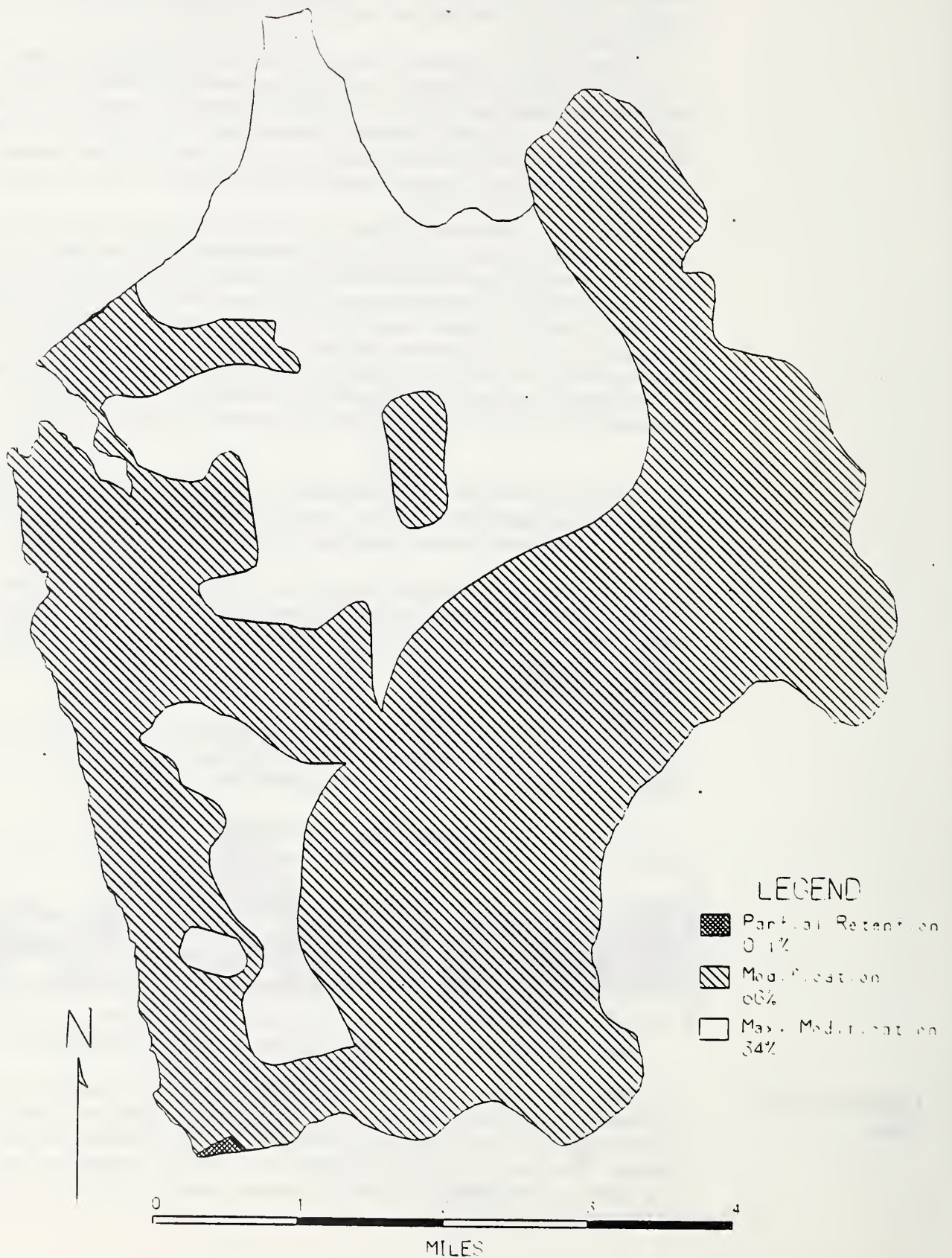
Maximum Modification

Landform and Soils

The landforms in the area are similar to those found in other mainland valleys in southeast Alaska. Frosty Creek is in a glacial-carved U-shaped valley. Valley sideslopes are generally moderately steep and contain numerous very steep, bluff-like areas. Streams which flow into Frosty Creek often occur in deep, steep-sided, V-notched drainages. A broad plateau is found at elevations above 1000 feet, with abundant small hills and pot hole lakes.

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Map 3-5. Visual Quality Objectives in the Frosty Study Area.



Most forested soils in the area are typical of southeast Alaska and are topped by a thick organic layer which makes them resistant to surface erosion unless disturbed. In general, when the organic layer is disturbed and/or removed, the underlying mineral soils are sensitive to erosion.

Some typical mineral soils in the area have formed in place as a thin layer over the granite-like bedrock. Other areas have deeper soils deposited by the glaciers on the lower slopes. Muskeg areas with very poorly drained organic soils are located throughout the area and dominate the landscape of the higher elevation plateau.

Table 3-1. Distribution of Soil Hazard Classes in the Frosty Area

Soil Erosion Hazard Class	Acres	Percent of Study Area
Low	8522	48%
Moderate	6424	36%
High	2744	16%
Total	17,690	100%

Erosion is a natural force that occurs in every natural landscape. The landslide is the most severe type of erosion in the southeast Alaska. It generates most of the natural sedimentation in the area and is most common where unstable soil materials occur on steep slopes. Such areas are normally excluded from timber harvest activities. The locations of hazardous soils are displayed in Map 3-6 on the next page. The distribution of hazardous soils is shown in Table 3-1.

Watershed

The Frosty area contains four watersheds. Two of these would be affected by the proposed project. The watershed for Frosty Creek is the largest, at 11,179 acres. A smaller, unnamed watershed would also be influenced (see Table 3-2).

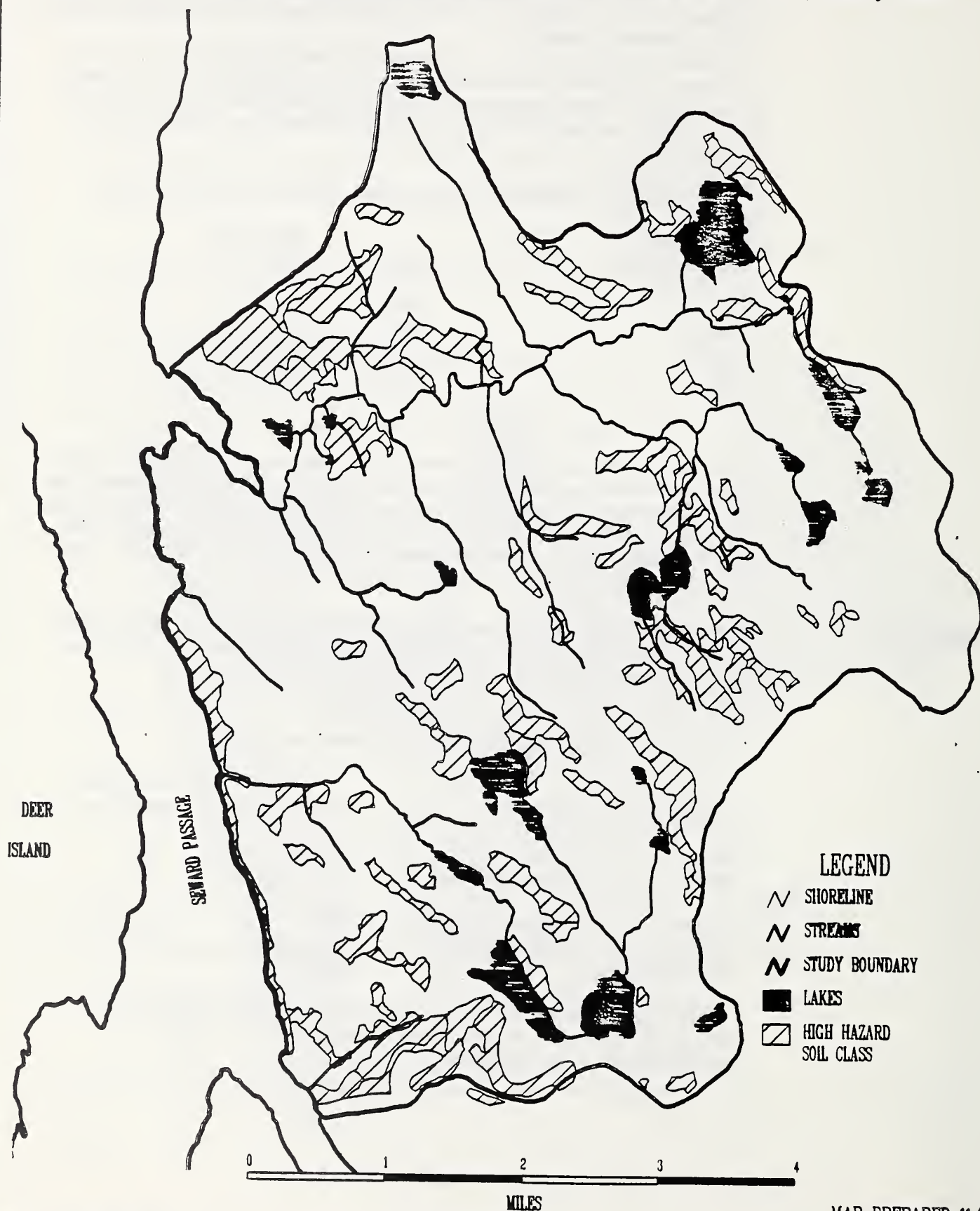
Table 3-2. Watersheds in Frosty Study Area

Location	Watershed	Acres	Total Stream Length (mi)
Within Project	Frosty Creek	11,179	27.9
	Unnamed Creek 1	432	1.1
Outside Project	Unnamed Creek 2	3,832	6.3
	Unnamed Creek 3	490	1.0
Total Acres		15,933*	

* The acreage for the combined watersheds does not match acreage for the entire study area boundary (18,611 acres) because of differences in the watershed and study area boundaries.

3 Affected Environment

Map 3-6. Distribution of High Hazard Soils in the Frosty Study Area.



Most of the stream length in the Frosty area is contained, controlled by bedrock, and stable (see Table 3-3). This includes the mainstem of Frosty Creek and the higher-gradient tributaries. A smaller percentage of the stream length is dependent on alluvium and riparian vegetation for bank stability and is therefore more sensitive to disturbance. These include the low to moderate-gradient channels in the middle reaches of the watershed.

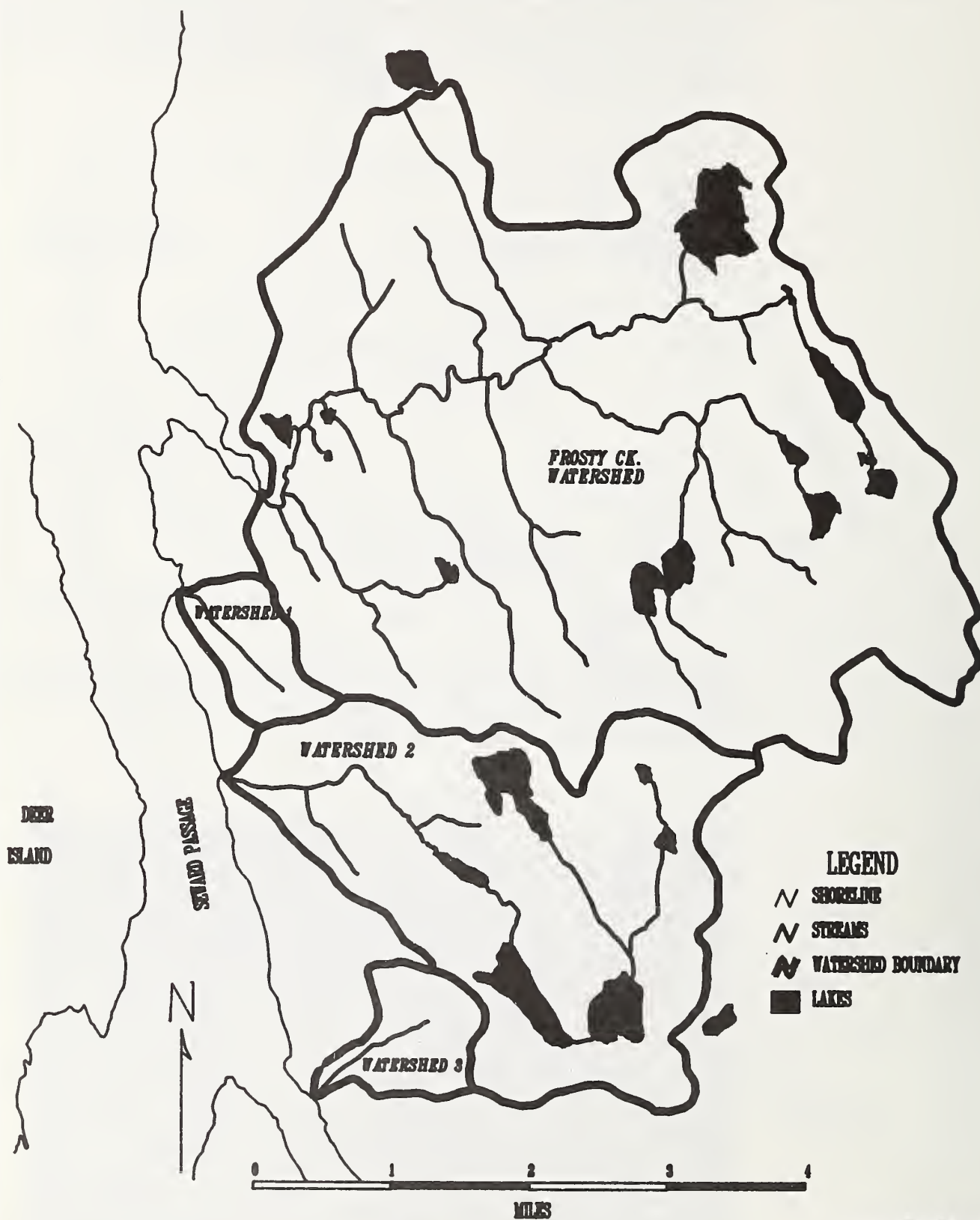
Table 3-3. Length of Stream in each Process Group* on Frosty Creek.

STREAMBANK SENSITIVITY	PROCESS GROUP*	FROSTY CREEK STREAM LENGTH
HIGH	1. Low Gradient Floodplain	2.9
	2. Alluvial Fan	1.5
	3. Mixed Control Moderate Gradient	.8
	7. Placid or Glide	.3
	8. Estuaries	.2
		= 20% stream length
LOW	4. Large Low Gradient Contained	1.9
	5. Moderate Gradient Contained	5.6
	6. High Gradient Contained	14.7
		= 80% stream length

*The channel types have been grouped according to the stream processes that formed them. These processes reflect the long-term interaction of geology, landform, climate, and resultant vegetation patterns. See Appendix D for more detailed descriptions of the process groups.



Map 3-7. Watershed Boundaries



Minerals

The Bureau of Land Management (BLM) Mining Activity Report, dated October 3, 1988, indicates no mineral claims within the study area. It is possible that some prospecting is taking place and that more prospecting might occur if roads are built.

Lands

All lands within the study area are National Forest System Lands. No special uses have been authorized by permit. No encumbrances are known to exist.

The State of Alaska has started the process to select 4,090 acres near the Tyee Lake hydroelectric plant for development of a new community and a deep-water port. The land selection is located at the head of Bradfield Canal, approximately 20 miles east of the study area. Such development could generate an increase in recreation use, not only in the Bradfield Canal area, but in the Frosty Bay area as well.

Timber

The Frosty area contains uneven-aged stands of western and mountain hemlock, Sitka spruce, Alaska yellow-cedar, and western redcedar. The species composition usually varies by site. Sitka spruce and mixed hemlock-spruce stands occur on the lower slopes and in stream bottoms. Western redcedar is usually found at lower elevations and along the shoreline. Yellow-cedar is found at higher elevations and at wetter sites at low elevations. Some mountain hemlock also grows in the area. The upper elevations are interspersed with commercial forest stands, scrub timber, and muskeg. There are no known threatened, endangered, or sensitive plants in the Frosty study area.

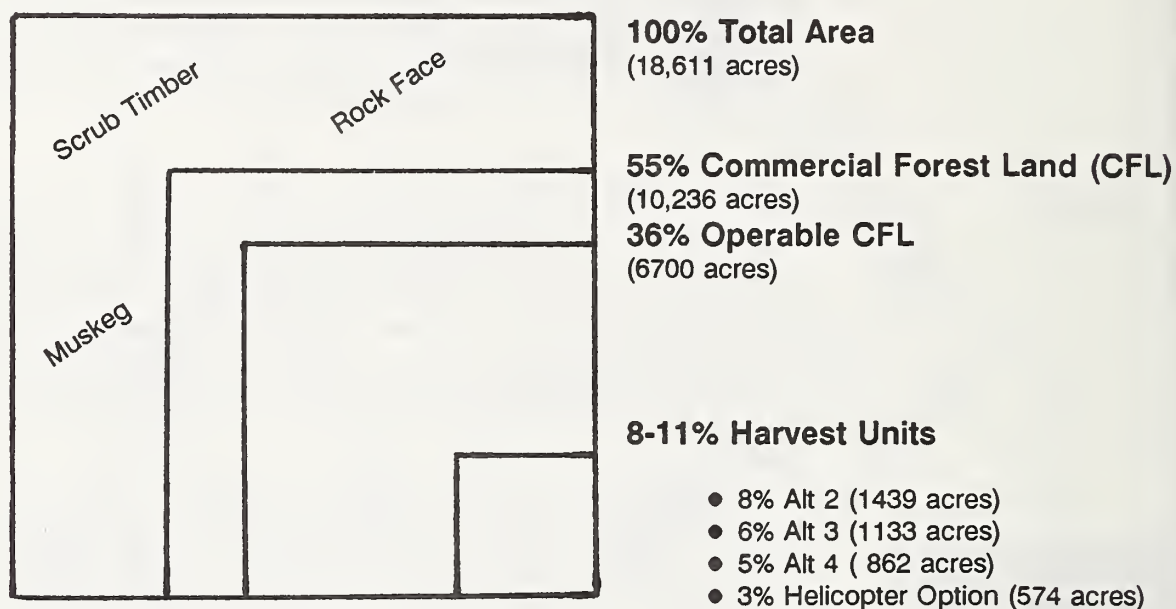
Dead and dying tree crowns and snags are common within the old-growth stands. Many of the trees are decaying and have already lost a significant portion of their volume to rot. Dwarf mistletoe, which can retard growth in heavily infected hemlocks, is heavy in the stands around Frosty Bay, but is moderate to non-existent as one moves inland. Alaska Cedar Decline is a phenomenon that results in dead Alaska yellow cedar trees not only in this area but throughout southeast Alaska. The affected areas are generally around edges of muskegs and the transitional zones between the muskegs and the higher volume-stands. The cause of this decline is not known.

There has been no extensive timber harvest within the study area other than selection of individual trees that were accessible from the water. However, two second-growth stands are located near the mouth of Frosty Bay. They were harvested in 1947 (27 acres) and 1917 (72 acres). The remaining 10,071 forested acres are classified as old-growth forest.

Of the 18,611 acres in the Frosty area, 55 percent is considered commercial forest land. Commercial forest land (CFL) is land that can produce at least 8,000 board feet of timber per acre in 100 years (see Figure 3-2). Non-CFL includes muskeg, rock surfaces, and sparsely stocked, poor timber-growing sites. If the timber on CFL can be harvested, it is considered operable (see Map 3-8 for location of operable CFL). Inoperable CFL cannot be reached with conventional harvest systems or nonconventional aerial systems. The operable CFL comprises 66 percent of the CFL and 36 percent of the total landbase in the Frosty area.



Figure 3-1. Proportion of Frosty Study Area that Is Operable CFL



CFL is often described in terms of the volume of timber on each acre. Volume is a measure of number and size of trees, expressed in board feet. Fifty-three percent of the operable, commercial forest land in the Frosty area occurs in volume class 4, with 8,000 to 20,000 board feet of timber per acre (see Table 3-4). Thirty-six percent occurs in stands of 20,000 to 30,000 board feet per acre, and only 11 percent occurs in high-volume stands between 30-50,000 board feet per acre. Volume classes of 4 or higher are considered high enough in timber value to harvest. Less than one percent of the operable CFL occurs in stands with less than 8,000 board feet per acre. These include the harvested stands mentioned previously and neither area yet contains enough volume to warrant harvest.

Table 3-4. Acreage by Volume Class

VOLUME CLASS	Board Feet Per Acre	COMMERCIAL FOREST LAND Acres (%)	OPERABLE CFL Acres (%)
3	< 8,000	384 (3.8)	16 (0.2)
4	8-20,000	5,478 (53.9)	3,544 (52.8)
5	20-30,000	3,350 (32.9)	2,388 (35.6)
6	30-50,000	958 (9.4)	768 (11.4)
7	50,000+	0 (0.0)	0 (0.0)
All Classes		10,170 (100%)	6,716 (100%)

Employment

The timber and fishing industries provide the majority of all jobs in the primary employment sector in southeast Alaska. In Wrangell, timber harvest and milling are the primary employers followed by Federal, State, and local government, and seafood harvesting and processing. The Wrangell Forest Products sawmill is the town's largest employer and tourism is an emerging industry. Ketchikan is the State's fourth largest city. Its economy is based on timber, fishing, and tourism. In Myers Chuck, most of the residents fish for a living. Thoms Place is a small settlement that is also dependent on fishing.

Transportation

This area is currently unroaded and there are no developed or maintained trails. The proposed road system is not designed to interconnect with any other road system on the Cleveland Peninsula, nor is it expected to connect in the foreseeable future.

Other Planned or Proposed Activities In Surrounding Area

A number of projects are proposed or in process on surrounding National Forest System lands. Although the projects are unrelated, they could affect the Frosty area in the future.

Power Corridor

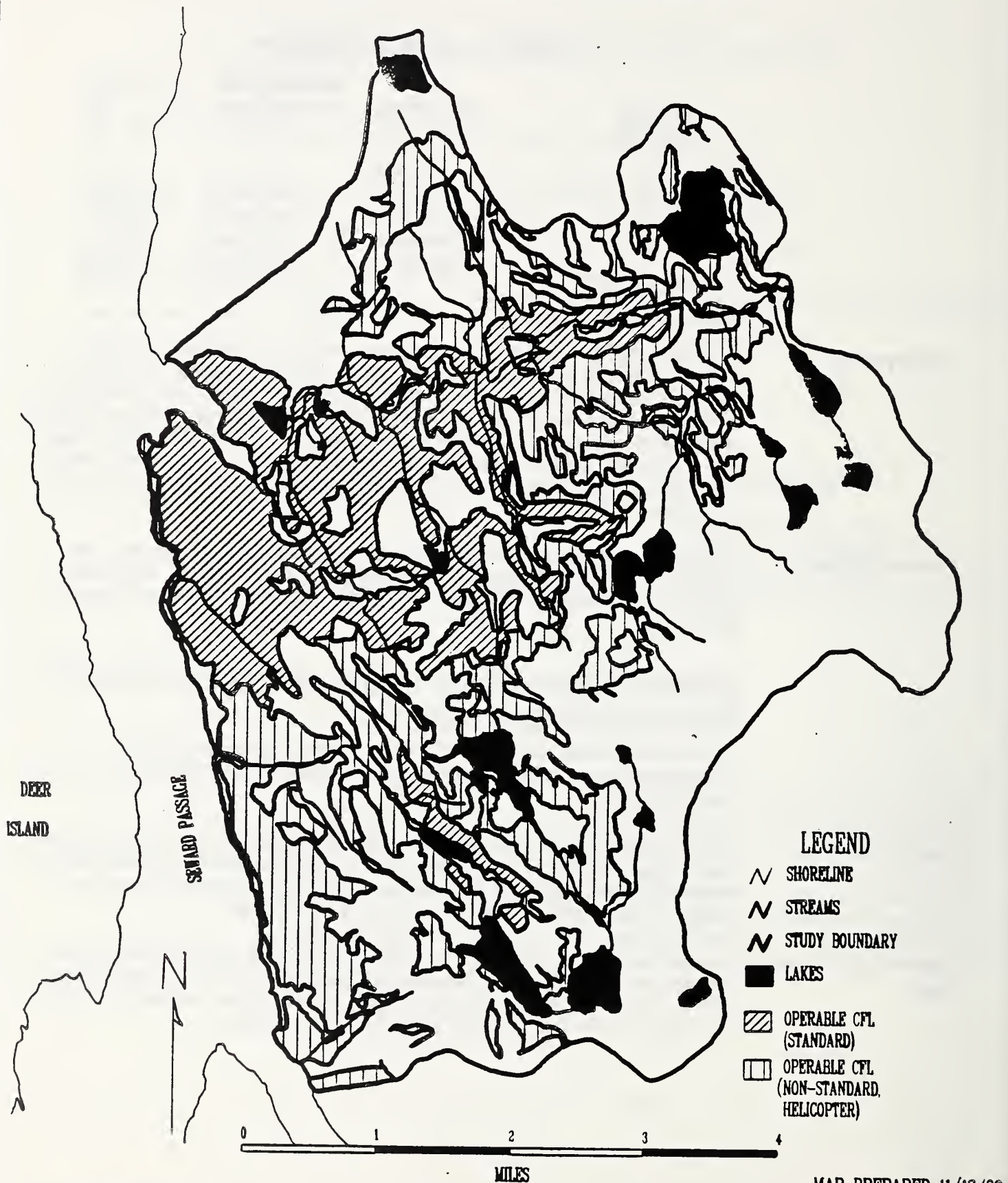
A utility corridor through the Frosty area has been proposed in one of the alternatives of a Draft EIS written by the Ketchikan Area of the Tongass National Forest. The EIS examined the possibility of an electric power transmission intertie for Southeast Alaska. No road linkages were proposed in the Frosty area.

Deer Island Timber Sale

In November, 1985, a timber sale was sold on Deer Island, located across Seward Passage from the Frosty area. The sale scheduled a harvest of 14.8 MMBF of timber from 466 acres. Harvest activities have begun and should be completed by March 31, 1990. The purchaser is using helicopters to yard this sale.

3 Affected Environment

Map 3-8. Operable, Commercial Forest Land



**Bradfield River
Road**

A joint Federal/State/Private task force has evaluated the possibility of a road corridor from the Bradfield Canal to Johnny Mountain Mine, British Columbia, with an eventual connection to the Cassiar Highway in British Columbia, approximately 40 miles away. More recently, the State of Alaska has funded an economic feasibility study of a road along this corridor and alternative routes. Recreational use of the Frosty area could increase if a road connection were made and if the population increased at the head of the Bradfield Canal.

**Forest Plan
Revision**

The Tongass National Forest Land Management Plan (the Forest Plan) is being revised. As part of the revision process, changes in management direction for the Frosty Study Area will be considered. Even so, management activities will continue under the direction of the current plan until the revision process is completed. The proposed timber sale is consistent with the current plan direction and is scheduled to be sold prior to the completion of the revised plan.



Chapter 4

Environmental Consequences

Chapter 4

Environmental Consequences

Introduction

The purpose of this chapter is to describe the physical, biological, economic, and social effects likely to result from putting each of the alternatives into effect. The information has been taken from more detailed reports that are available for public review in the planning record, located at the Wrangell Ranger District, Wrangell, Alaska.

Adverse Environmental Effects Which Cannot Be Avoided

There are some adverse effects which cannot be avoided if one of the action alternatives is selected.

Harvest in the Frosty area would reduce the number of old-growth stands. Because some wildlife species rely on old-growth habitat conditions, a reduction in the habitat capability for some species is expected.

Ground disturbing activities such as stream crossings and culvert installation would temporarily increase silt loads in Frosty Creek and its tributaries. In addition, a small loss of fish habitat would occur at road crossings and in those portions of fish habitat occupied by culverts.

Timber harvest and road construction would change the appearance of the landscape. The area most people would notice the changes from would be Seward Passage near the mouth of Frosty Bay and in Frosty Bay itself. The effects would diminish when the vegetation grew back.



Irreversible Loss of Resources

An irreversible loss is a permanent or long-term use of a resource that is not replaceable within a lifetime, including the destruction of a cultural site or consumptive use of minerals. In the Frosty study area, cultural artifacts and cultural sites could be irreversibly disturbed as a result of the timber sale. Subsurface cultural sites that cannot be located with surface surveys are especially vulnerable. The harvest of old-growth timber in the Frosty area is also an irreversible loss because the stands take a long time to develop and the commitment of this resource to timber harvest is reversible only over a long period of time.



Irretrievable Commitment of Resources

An irretrievable commitment is a decision that makes other choices unavailable during the life of the commitment. The decision cannot be retrieved for the time that has already passed, but could be changed in the future.

Timber harvest and road construction would irretrievably remove the opportunity to use those parts of the Frosty area for primitive, unroaded recreation until the vegetation grows back. The construction of roads and the establishment of rock pits is also considered an irretrievable commitment that would reduce or eliminate soil productivity on those sites unless they are rehabilitated. The establishment of buffer strips around eagle nest trees, around cultural sites, and within Aquatic Habitat Management Units (AHMUs) makes these buffer areas unavailable for timber harvest.

Summary of Consequences

A summary of the consequences of each alternative is displayed in Table 4-1 on the next four pages.

Table 4-1. Summary of Consequences

ELEMENT OF PROPOSAL	ALT 1	ALT 2	ALT 3	ALT 4	HELI
TIMBER HARVEST					
Total Volume (MMBF)	0	28	22	17	12
Harvest Acres	0	1439	1133	862	574
Percent Harvested of:					
Total Commercial Forest Land (CFL) (out of 9882 acres)	0%	15%	11%	9%	6%
Operable CFL (out of 7341 acres)	0%	19%	15%	12%	8%
Normal CFL (can be harvested with standard cable logging systems) (out of 3230 acres)	0%	45%	35%	27%	0%
Non-Standard CFL (requires heli- copter, balloon, long-span, etc.)(out of 4201)	0%	0%	0%	0%	14%
Number of Units over 100 acres	0	2	0	0	4
Percent Harvest by Volume Class					
4: 8-20,000 BF/acre	0%	37%	39%	41%	39%
5: 20-30,000 BF/acre	0%	48%	47%	41%	39%
6: 30-50,000 BF/acre	0%	15%	14%	18%	22%
	0%	100%	100%	100%	100%
ROAD CONSTRUCTION					
Miles of Specified Road* Construction	0	14.0	14.0	11.6	0
Miles of Spur Road** Construction	0	11.0	7.4	5.7	0

*Location of the road and construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent roads or system roads.

**Location of the road is selected by the contractor and approved by the Forest Service. Spur roads are sometimes referred to as temporary or non-system roads.

4 Environmental Consequences

Table 4-1. Summary of Consequences (continued)

CONSEQUENCES	ALT 1	ALT 2	ALT 3	ALT 4	HELI
DEER HABITAT					
Acres of Deer Winter Range Harvested	0	1028	803	551	220
Percent of Deer Winter Range Harvested	0	10%	8%	5%	2%
Number of Deer Area Could Support:					
Mild Winter	811	725	744	765	-20*
Moderate Winter	356	298	311	326	-13*
Severe Winter	136	102	110	118	-8*
Relative Impact on Resident Deer Population (none/minor/major)	none	major	minor	minor	minor

* Addition of helicopter option would reduce the number of deer in each alternative as shown.

MARTEN HABITAT					
Acres of Marten Winter Range Harvested	0	1460	1132	806	410
Percent of Marten Winter Range Harvested	0	12%	10%	7%	3%
Number of Marten Area Could Support	36	31	32	33	-1*
Relative Impact on Resident Marten Population (none/minor/major)	none	minor	minor	minor	minor

* Addition of helicopter option would reduce the number of marten in each alternative as shown.

GOOSE HABITAT

The habitat requirements of the Vancouver Canada goose are not well understood. Consequently, figures are not available for (1) the proportion of habitat harvested and (2) the number of geese supported in each alternative. To learn more about the impacts of timber harvest on the Canada goose, the Frosty area goose population will be monitored during harvest activities.

Table 4-1. Summary of Consequences (continued)

CONSEQUENCES	ALT 1	ALT 2	ALT 3	ALT 4	HELI
BEAR HABITAT					
Acres of High-volume Old Growth Harvested	0	211	153	153	125
Percent of High-volume Old Growth Remaining	100%	78%	84%	84%	-13%*
Relative Impact on Resident Bear Population (none/minor/major)	none	minor	minor	minor	minor
*Subtract 13% from each of the action alternatives to obtain the percent habitat remaining if the entire helicopter option is harvested.					
EAGLE HABITAT					
Acres of Beach Fringe Nesting Habitat Harvested	0	117	40	0	0
Percent of Beach Fringe Nesting Habitat Harvested	0%	24%	8%	0%	0%
Number of Eagle Nest Trees and Buffer Zones Affected	0	3	2	0	0
Relative Impact on Resident Eagle Population (none/minor/major)	none	major	minor	none	none
WATER QUALITY/FISH HABITAT					
Miles of Class 1 Stream Requiring AHMU prescriptions	0	1.0	0.9	0.5	0
Miles of Road Built within Class 1 AHMU	0	0.6	0.4	0.2	0
Number of Road Crossings of Class 1 Streams	0	4	4	1	0
SUBSISTENCE					
Extent of Impact on Subsistence Use (none/major/minor)	none	minor	minor	minor	none

4 Environmental Consequences

Table 4-1. Summary of Consequences (continued)

CONSEQUENCES	ALT 1	ALT 2	ALT 3	ALT 4	HELI
VISUAL QUALITY					
Inventory VQO is Met in Areas Viewed from Frosty Bay			X		*
Inventory VQO is Met in Areas Viewed from Seward Passage			X		*
Inventory VQO is Met in Areas not Generally Seen		X	X	X	*
* Addition of the helicopter option would not change whether or not an alternative meets inventory VQOs.					
WATERSHED SENSITIVITY					
Percent of Watershed Harvested (no AHMU buffer acreage taken out yet)					
Frosty Creek (11,179 acres)	0%	10.7%	8.9%	7.5%	5.1%
Unnamed Creek 1 (432 acres)	0%	10.3%	3.5%	0%	0%
ECONOMIC FACTORS					
Total Pond Log Selling Value (\$ million)	0	10.1	8.0	6.2	4.4
Total Costs to Operator Including Profit & Risk (\$ million)	0	9.2	7.6	6.0	3.3
Possible Return to Government (\$ thousand)	0	952	462	204	1092
EMPLOYMENT					
Number of Jobs Generated	0	196	154	119	84
Dollar Value of Jobs (\$ million)	0	4.51	3.54	2.74	1.93
Dollar Value Secondary (\$ million)	0	31.57	24.78	19.18	13.51

Wildlife

Consequences to Specific Resources

The consequences of timber harvest on some wildlife species were analyzed with the use of habitat capability models developed for the Forest Plan revision. The models generate habitat suitability indexes that indicate differences in trends between alternatives rather than absolute values. The habitat suitability index (HSI) generates a range of values from 0 to 1, with "0" having no value for a particular species and "1" indicating optimum habitat. A value of 0.25 indicates an area with the ability to support 25 percent of the animals that the very best habitat could support.

The models were used on both the Sitka black-tailed deer and the pine marten. Two figures were estimated for both species: (1) immediate impact and (2) cumulative effects of harvest over the 100-year rotation as described in the Forest Plan. The biological relationships expressed in the models were assumed to be valid for an estimate of the effects on the Vancouver Canada goose, black bear, and bald eagle.

Sitka Black Tailed Deer

Model assumptions:

- Winter range is the limiting factor. It occurs below 1200 feet in elevation on north facing slopes and below 1500 feet on east, west, and south facing slopes.
- High volume class, southerly aspects, and low elevations have higher value to deer than low volume class, non-southerly aspects, and high altitudes.
- Optimum winter deer habitat can support 125 deer per square mile (640 acres) during a mild winter.



Alternative 2 reduces carrying capacity by 26 percent while Alternative 3 reduces carrying capacity by 20 percent and Alternative 4 by 9 percent. The helicopter option would reduce the carrying capacity an additional 10 percent.

Much of the land is low in value as winter range, and wolf predation is also thought to keep deer numbers low. The deer habitat within the Frosty area is currently capable of supporting approximately 811 of the 2063 deer that an equal area of optimum habitat could support (see Table 4-2).

Table 4-2. Number of Deer the Frosty Area Could Support in each Alternative.

SEVERITY OF WINTER	NUMBER OF DEER					Cumulative Effects Over 100-Year Rotation**
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	*Heli- copter	
Mild	811	725	744	765	-20	2063
Moderate	356	298	311	326	-13	211
Severe	136	102	110	118	-8	66

* Addition of helicopter option would reduce the number of deer in each alternative as shown.

**Assuming maximum harvest allowed by Forest Plan.

4 Environmental Consequences

The model was also used to estimate the cumulative impacts of multiple entries into the area. If the maximum amount of timber allowed under Forest Plan direction were harvested (95 percent of the operable CFL over the 100-year rotation), the population would decline from 136 to 66 animals during a severe winter.

The road system would improve access to the area. As a result, hunting effort might increase.

Pine Marten

Model assumptions:

- Winter range is the limiting factor. Marten prefer high-volume, old-growth forests with many large fallen and standing snags with nearby small meadows close to water.
- Large openings are avoided by marten because of increased exposure to predators.
- Older second-growth stands (25-100 years) are avoided because these stands do not provide suitable prey or logs for denning.
- Optimum marten habitat the size of the Frosty area could support 73 marten.



According to the model, the area is currently capable of supporting approximately 36 of the 73 marten that an optimum habitat could support because much of the land is low in value as marten habitat (see Table 4-3). Alternative 1 would support 36 marten, the maximum for the Frosty area. Alternative 2 would support 31 marten; Alternative 3, 32 marten; and Alternative 4, 33 marten (see Table 4-3). If the helicopter option were added to an alternative, one less marten could be supported.

Table 4-3. Number of Pine Marten the Frosty Study Area Could Support in each Alternative.

NUMBER OF MARTEN

Alt. 1	Alt. 2	Alt. 3	Alt. 4	Heli-copter	Optimum Habitat	Cumulative Effects Over 100-Year Rotation*
36	31	32	33	-1**	73	23

* Assumes maximum harvest allowed by the Forest Plan.

** If the helicopter option were added to an alternative, the number of marten that could be supported in the Frosty area would be reduced by one.

The model was also used to estimate the cumulative impacts of multiple entries into the area. If 90 percent of the riparian marten habitat were harvested, and 95 percent of the non-riparian operable CFL were harvested over the 100-year rotation (the maximum allowed under Forest Plan direction), the population would decline to 23 animals.

Roads would allow access to the upper Frosty Creek watershed by snowmobile in winter. This could result in more trapping, which could reduce the marten population.

Vancouver Canada Goose

The impacts of a timber sale on the Vancouver Canada Goose are related to the amount of riparian, old-growth habitat remaining after harvest. In this area, geese nest in old-growth timber although they do feed around the edges of openings such as meadows and muskegs. The goslings are dependent on timber and heavy brush for hiding cover.

Each action alternative would follow Aquatic Habitat Management Handbook (AHMU) guidelines and would protect most of the existing goose habitat by providing buffers along streambanks.

During harvest activities, geese will probably avoid habitat along roadsides and reoccupy these areas once the traffic ceases. Adult and juvenile geese will probably use young clearcuts for foraging.

The impacts of logging activities on nesting geese are not well known. A timber sale in the Frosty area would be an opportunity to evaluate the impact of logging and road building on nesting geese, on the number of years before geese reoccupy disturbed sites, and on differences between use of clearcuts and second-growth forest as compared to old-growth forest. Knutson-Vandenberg funds (KV funds) will be collected from the Frosty timber sale receipts to fund a goose monitoring project. If results of the study indicate a need for enhancing goose habitat, goose nesting platforms could be constructed or other mitigation measures could be taken to improve nesting habitat.

Black Bear

In southeast Alaska, black bears often use large downed logs and standing hollow trees for winter denning sites. Such logs and trees are typically found in high-volume, old-growth stands. The consequences of timber harvest on black bear are therefore related to the extent to which high-volume old-growth habitat is removed. Alternative 2 would harvest 22 percent of the high-volume old-growth habitat while Alternatives 3 and 4 would harvest 16 percent (see Table 4-4). The helicopter option would harvest 13 percent in addition to the alternative that is selected.

If 95 percent of the operable CFL were harvested over the 100-year rotation (the maximum allowed under Forest Plan direction), 39 percent of the high-volume old growth and 61 percent of the low- and moderate-volume old growth would still remain.

Black bear use of the Frosty area is considered low by Forest Service wildlife biologists, and regardless of the alternative chosen, they anticipate that the remaining old growth would be adequate meet black bear denning needs. Erickson's research on Mitkof Island (1982) suggests that black bear will den in clearcuts if hollow logs are left following harvest.

Table 4-4. Proportion of High-Volume (30-50,000 Bd Ft/Ac) CFL Harvested

CFL ACRES	PERCENT HARVESTED				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Helicopter
958	0%	22%	16%	16%	13%

4 Environmental Consequences



Bald Eagle

The consequences of timber harvest on bald eagles are related to the extent to which active nest trees are avoided and beach fringe habitat is left standing. Three eagle nest trees have been found in proposed harvest units. In each action alternative, the nests will be protected with 330-foot buffer strips.

Alternative 2 would harvest 117 acres of beach fringe and reduce eagle nesting habitat by 24 percent. Alternative 3 would harvest 40 acres and reduce habitat by 8 percent. Alternative 4 would not harvest any beach fringe habitat, nor would the helicopter option.

The impacts of a timber sale on fish habitat depend on many factors. One measure of potential impacts is the extent to which trees are left standing on streambanks. Trees along the banks perform the following functions:

- hold streambanks in place,
- filter out sediment that could interfere with salmon spawning success,
- provide large, woody debris required to help create salmon and trout rearing habitat, and
- shade water so over-heating and subsequent fish kills are less likely in temperature-sensitive streams.



Guidelines for managing timber near streams have been established in the Aquatic Habitat Management Handbook and would be followed in each of the action alternatives. The guidelines were designed according to three classes of aquatic habitat management units (AHMUs). AHMUs include the portion of land encompassing the stream channel and banks as well as all flood plains and a zone of at least 100 feet on either side of a stream.

Class 1 AHMUs contain streams with anadromous fish habitat, streams that could provide anadromous fish habitat if a structure allowed fish to pass over a migration barrier, and streams with a population of resident trout considered important for sport fishing. Stream gradient usually ranges from 0 to 6 percent. Harvest of selected trees is allowed, primarily along the outer edge of the AHMU to make the it more windfirm, but as a guideline, at least 80 percent of the trees in the AHMU will be left standing along the stream banks.

Class 2 AHMUs contain streams with resident fish populations only. The populations have some sport fishing values and may contain catchable-sized fish. They generally occur upstream of migration barriers or steep gradient streams that preclude anadromous fish use. Stream gradient usually ranges from 6 percent to 15 percent. Again, harvest of selected trees is allowed, but as a guideline, at least 40 percent of the trees in the AHMU will be left standing along the stream banks.

Class 3 AHMUs contain streams that, while having no fish populations, could affect downstream water quality and fish habitat. Stream gradient is usually greater than 15 percent. Once more, harvest of selected trees is allowed, but as a guideline, at least 10 percent of the trees in the AHMU will be left standing along the stream banks.

If these guidelines are followed, no measurable effect is anticipated and there will be no habitat-related reduction in the fish population. However, the trees remaining in each AHMU are at risk to blow down. Thus the potential impact of timber harvest on fish is related to the probability of trees within an AHMU being blown down. Probability, in turn, is related to the number of miles of stream requiring AHMU prescriptions and whether both sides of the stream would be impacted or only one side. Alternative 2 would require AHMU prescriptions of the greatest length, followed by Alternative 3 (see Table 4-5). Alternative 4 would require prescriptions along the shortest length. The helicopter option would add little impact because the units are predominantly along Class 3 streams.

Table 4-5. Miles of Stream Protected by Class 1, Class 2, and Class 3 AHMU Prescriptions.

AHMU CLASS	MILES OF STREAM PRESCRIPTION				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Helicopter
Class 1: 1 side	0	0.3	0.4	0.2	0
Class 1: 2 sides	0	0.8	0.5	0.3	0
Class 2: 1 side	0	0.3	0.1	0.1	0.1
Class 2: 2 sides	0	5.1	4.5	3.6	.5
Class 3: 1 side	0	0	0	0	0.3
Class 3: 2 sides	0	0.4	0.2	0.2	0.5
TOTAL	0	6.9	5.7	4.4	1.4

There is very little fishing pressure on the resident trout in Frosty Creek. Increased access provided by the establishment of a road system would probably result in a slight increase in levels of sport fishing within the study area during and after completion of the sale, but not enough to affect fish population numbers.

Subsistence

Construction of roads would improve access to the interior of the area. The access might spread out subsistence users but would probably not result in an increase in total use. Reductions in carrying capacity for furbearers would probably result in a corresponding reduction in trapping success; however, the known trapping is done for commercial rather than subsistence purposes. The operation of a logging camp would increase the competition for subsistence resources during sale operations. Construction and operation of a log transfer facility would not conflict with any known saltwater subsistence uses.

ANILCA Section 810 Finding: Based on this evaluation, none of the alternatives would result in significant restriction for subsistence uses and needs.

Hunting and Trapping

Access to the Frosty area would be improved as a result of a timber sale and there would probably be an increase in the extent to which the area was used for hunting and trapping.

Recreation

A number of consequences are common to all of the action alternatives:

1. The character of some recreation opportunities would change from undeveloped and primitive to modified and motorized. This is consistent with the area's LUD IV status. (See Table 4-6 for changes in recreational opportunity.)

2. The construction of roads would provide easier access for hunting, hiking, sport fishing, and for other recreation opportunities within the area.
3. The carrying capacity for old growth dependent species could decrease, and with it, the likelihood of hunting success.
4. The area would become more attractive as a destination site if a sale administration cabin is converted for use as a recreation cabin following the timber sale. Development of a trail system would also contribute to the attractiveness of the area and recreation use would probably increase slightly as a result.

Alternative 1 would leave the recreation opportunities unchanged. Frosty Bay would remain an undeveloped recreation attractor and use would continue to be dispersed and light to nonexistent. Although recreation could be developed in the area regardless of timber harvest, it would be less likely to occur as soon.

Alternative 2 would build the same amount of specified road as Alternative 3, but with more spur roads, thereby providing the greatest access. It would also convert the greatest area from Primitive recreation opportunities to Roaded and Modified opportunities (see Table 4-6). It would also have the greatest impact on wildlife populations. Alternative 2 would harvest timber along the southwest edge of Frosty Bay, risking the chance that winds could blow across a previously protected anchorage. Although the anchorage is not considered a destination site, it is occasionally used by commercial fishermen and recreational boaters in stormy weather.

Table 4-6. Changes In Type of Recreational Opportunity.

RECREATION OPPORTUNITY	ACRES PER ALTERNATIVE			
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Primitive	13,089	6,044	6,044	8,820
Semi-Primitive, Non-Motorized	4,089	5,049	5,187	4,211
Semi-Primitive, Motorized	1,643	3,333	3,336	3,950
Roaded Natural	0	0	152	110
Roaded Modified	0	4,395	3,890	1,370

Alternative 3 would change the recreation opportunities in much the same way as Alternative 2 (see Table 4-6). It would build as much specified road, build almost as much spur road, provide almost as much access, and convert many of the recreation opportunities from Primitive to Roaded and Modified. Wildlife carrying capacity would be reduced by nearly the same amount as in Alternative 2. Also note in Table 4-6, a small Roaded Natural area would be created where segments of road pass through large stands of timber not scheduled for immediate harvest. Alternative 3 would pose less risk than Alternative 2 to the wind protection in the Frosty Bay anchorage.

Alternative 4 would build the least road and provide the least access. It would also leave the greatest area in Primitive status for recreation opportunities. This alternative would create a smaller Roaded Natural area than Alternative 3. Alternative 4 would have the same impact on wind protection in Frosty Bay as Alternative 3 and less impact than Alternative 2.

The helicopter option is expected to have little impact on recreation opportunities.

Cultural Resources

The three known sites in the study area are surrounded by buffer strips and will not receive impact. It is more difficult, however, to predict the effects on sites that have not yet been identified. Ground disturbing activities can damage these sites. The area of ground disturbed in each alternative is displayed in Table 4-7.

Alternative 2 offers the greatest chance of damaging undiscovered sites. Alternative 3 provides slightly less chance of damage, and Alternative 4 is least likely to damage sites. The helicopter option would probably not increase the risk of damage because the units are on steep hillsides, far from the areas where past human use is likely to have occurred.

Table 4-7. Ground Disturbing Activities.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Hell
Specified Road Miles	0	14.0	14.0	11.6	0
Spur Road Miles	0	11.0	7.4	5.7	0
Acres of Harvest	0	1439	1133	862	573

Visual Resources

The impact of a timber sale on visual resources in the Frosty area is related to the extent to which harvest units are obvious from saltwater travel routes. Visual impacts were analyzed by generating computerized images of the portions of the harvest area visible from saltwater (see Figure 4-1 for view of harvest units with each alternative, including helicopter units). A number of consequences are common to all action alternatives:

1. Most of the road system would create relatively minor visual impacts. Roads in the seen area would be screened by vegetation or topography except where they enter harvest units.
2. Most rock pits would be located outside of visible harvest units and screened from Frosty Bay and Seward Passage by vegetation or landforms. The rock pit adjacent to the log transfer facility is likely to have a visual impact. It would not be seen from Seward Passage, but could be a major visual impact to Frosty Bay due to its size and proximity to the beach. The roadbed would help screen part of the pit.
3. The floating camp would change the view for three to five years. The proposed sort yard location adjacent to Unit #5 would not be seen from marine travel routes.
4. Several timber harvest units currently being cut on Deer Island are located on steep, highly visible slopes. Although the Deer Island and Frosty harvest areas are several miles apart, cumulative visual impacts would be evident to visitors travelling the length of Seward Passage. Existing clearcut units are also obvious near the mouth of Frosty Bay.

4 Environmental Consequences

Map 4-1. Location of Viewpoint for Visual Appearance of Proposed Harvest

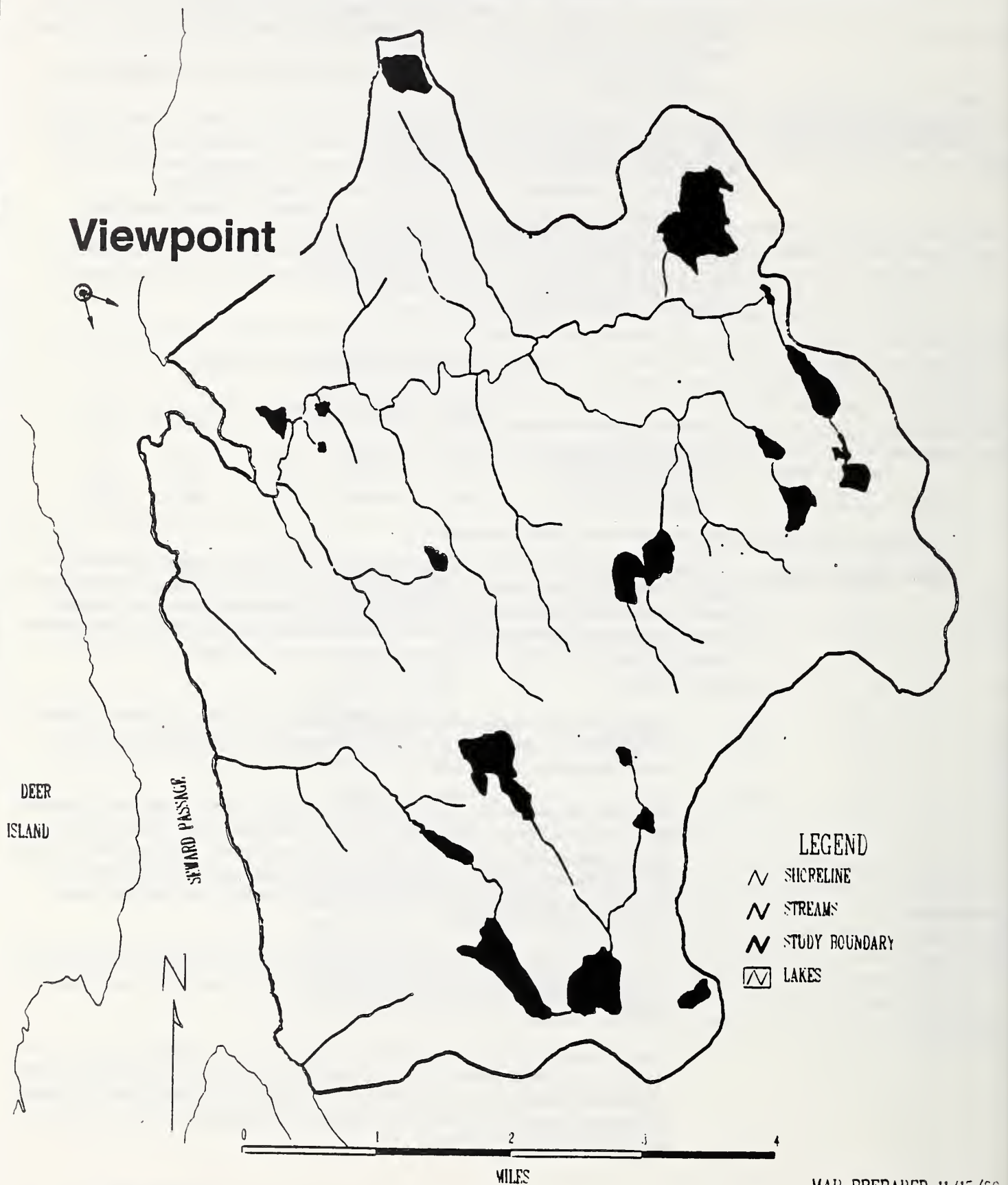
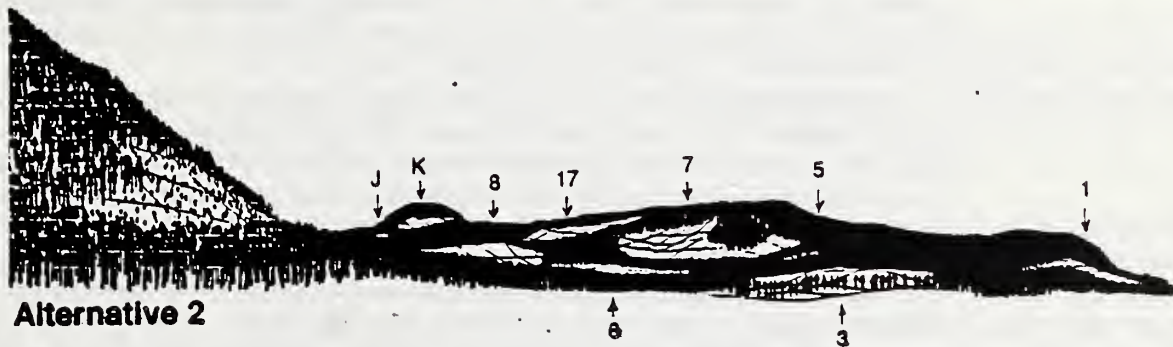


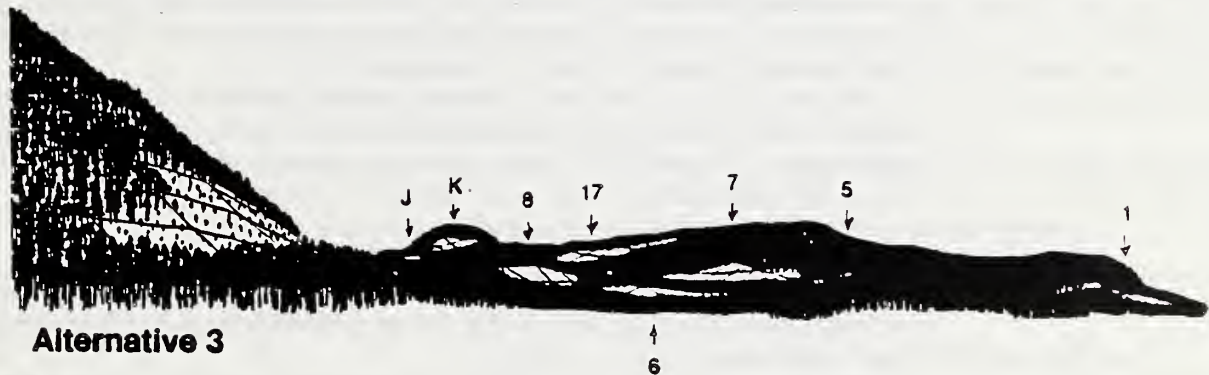
Figure 4-1. Visual appearance of harvest proposed in each alternative, including helicopter units, as viewed from Seward Passage.



Alternative 1



Alternative 2



Alternative 3



Alternative 4

*Plots do not display the mountains behind the harvest units because the terrain model used includes only the first four miles inland.

4 Environmental Consequences

5. Most helicopter units are located inland and would not be seen or would be only partially visible from a distance. Unit A would be obvious from Seward Passage and Frosty Bay due to its position high on the ridge.

Alternative 1

In Alternative 1 the area would remain in its natural visual condition. Though inventory visual quality objectives (VQOs) are Modification in the seen area and Modification and Maximum Modification in the unseen area, the visual condition would be consistent with a VQO of Preservation.

Alternative 2

In Alternative 2 the visual condition in the seen area would be consistent with a VQO of Maximum Modification, conflicting with the inventory VQO of Modification. Some of the harvest units would dominate the view from marine travel routes. The cumulative impact of the log transfer facility, the road development, and the timber harvest would be strongly evident to boaters using Frosty Bay for anchorage, and to users of the administrative cabin. When the cabin is later made available for recreational use, the impacts would still be obvious.

The road likely to cause the greatest visual impact from Seward Passage is the section parallel to the beach around Need Point to Frosty Bay. Following harvest, it is unlikely that the 100-foot-wide beach fringe would screen Unit 3 from view. An alternate road route under consideration but not yet field verified would bypass the Need point area, increasing the beach fringe screen for unit 3.

Units with potential to cause the greatest visual impacts are 1, 2, 3, 4, 6, 7, 8 and 17. The remaining units would either not be seen from nearby travel routes or their visual impacts would be slight. Harvest activities proposed in the unseen portion of the study area would be consistent with inventory VQOs of Modification and Maximum Modification.

Addition of the helicopter option would increase this Alternative's conflict with inventory VQOs. Portions of Units A, J, and K would be visible.

Fifty years after harvest, units from the first entry would no longer be obvious to a casual observer. Rock pits and roads would be screened by vegetation. A second entry at that time would be similar in visual impact to a first entry situation and could be designed to meet inventory VQOs.

Alternative 3

In Alternative 3 the visual conditions would meet the inventory VQOs of Modification as seen from Seward Passage and Frosty Bay, and Modification and Maximum Modification in the unseen area.

With the reduction in size of Unit 3, the proposed road around Need Point is not likely to be noticeable to a casual observer. An alternate road route under consideration but not field verified would bypass the Need Point area, increasing the depth of beach fringe screening for Unit 3.

Units 1, 6, 7, 8, and 17 would be obvious, but unit shapes and sizes would resemble natural landscape patterns. Portions of other units would be visible as well, but their shapes would appear natural. In 5 to 10 years, when units green up and road beds are overgrown, harvest units are likely to appear as natural occurrences in the landscape. The log transfer facility, road, and rock pit development would be evident, as would a portion of Unit 3, but vegetative screening between the road and shoreline could make these impacts acceptable in the context of a LUD IV area.

Addition of the helicopter option would have no effect on Alternative 3's meeting inventory VQOs. Portions of Units A, J, and K would be visible.

Thirty years after harvest, the landscape's visual condition would be consistent with a VQO of Partial Retention. Units would still be noticeable due to a difference in tree height; however, color and texture would be similar to that of adjacent old growth. A second entry at that time could be designed to meet inventory VQOs.

Alternative 4

In Alternative 4, looking from Seward Passage south of Need Point, the visual condition would be consistent with a VQO of Preservation, not the inventory VQO of Modification. Harvest activities would not be noticeable to a casual observer along this portion of the passage. Addition of the helicopter option would meet a VQO of Retention. Portions of harvest units would be visible but would not attract the attention of a casual observer.

Looking from Seward Passage north of Need Point, and from Frosty Bay, the visual condition would meet the inventory VQO of Modification. The VQOs would still be met even with the addition of the helicopter units. The log transfer facility and road would be obvious from within Frosty Bay and the northern portion of Seward Passage. In the unseen area, the visual condition would meet the inventory VQOs of Modification and Maximum Modification.

Thirty years after harvest, the landscape's visual condition would be consistent with a VQO of Partial Retention from Seward Passage north of Need Point, and Retention south of Need Point. Units would still be noticeable due to a difference in tree height; however, color and texture would be similar to that of adjacent old growth. A second entry at that time could be designed to meet inventory VQOs.

Landform and Soils

The risk of impact on soils from timber harvest is often rated in terms of soil hazard classifications. Soil hazard classes reflect the probability of soil movement resulting from logging or road building activities. The soils in the low hazard class are found on 0 to 35 percent slopes. They are mostly stable in the natural setting and have little probability of soil movement if disturbed. Moderate hazard soils are generally found on 35 to 75 percent slopes. They are relatively stable in the natural setting but the probability of movement increases if they are disturbed. The soils in the high hazard class are usually found on slopes greater than 75 percent. They often creep or slide in a natural setting and are extremely prone to soil movement if disturbed.

Consequences from timber harvest are related to the number of acres harvested and the soil hazard class on which the trees are growing. Table 4-8 shows the area of land in each hazard class that would be harvested for each alternative.

Table 4-8. Area Harvested in Each Soil Hazard Class

SOIL HAZARD CLASS	ALTERNATIVE				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Heli- copter*
Low	0	414	316	261	93
Moderate	0	906	730	515	324
High	0	134	102	102	141
Total	0	1454	1148	878	558

*Common to all action alternatives and would be in addition to area shown in each alternative.

Road building impacts are related to the length of road constructed and the soil hazard class in which each segment is built. Table 4-9 shows the miles of road in each hazard class for each alternative.

No additional impacts are expected for the helicopter volume because there will be no additional roads built. However, some of the helicopter units include some high hazard soils. Each of these areas will be field analyzed for suitability before it is harvested.

Table 4-9. Miles of Specified Road Proposed in each Soil Hazard Class.

SOIL HAZARD DESCRIPTION	ALTERNATIVE				Helicopter
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	
Low	0	8.0	8.0	6.8	0
Moderate	0	5.3	5.3	4.0	0
High	0	0.7	0.7	0.7	0
Total	0	14.0	14.0	11.5	0

Watershed

The impacts of a timber sale on water quality and quantity in the Frosty area are related to two factors:

1. The length of stream channel that is sensitive to streambank damage and must be protected from timber harvest by aquatic habitat management units (AHMUs).
2. The total area of harvest within the watershed.

The aquatic habitat management unit (AHMU) guidelines will be followed and there should be no noticeable effect on the watersheds in most cases (see page 4-10 for description of AHMU guidelines). However, the trees remaining in each AHMU near a harvest unit are at an increased risk to blow down. The impact of timber harvest on watershed values is related to the probability of trees remaining in an AHMU being blown down along stream channels sensitive to bank erosion. The probability, in turn, is related to the number of miles of sensitive streams protected by AHMU prescriptions. Alternative 2 would harvest timber along the greatest length of sensitive streambank, followed by Alternative 3 (see Map 4-2 and Table 4-10). Alternative 4 would harvest timber along the shortest length of sensitive streambank. The helicopter option would have some additional impact where units border streams.

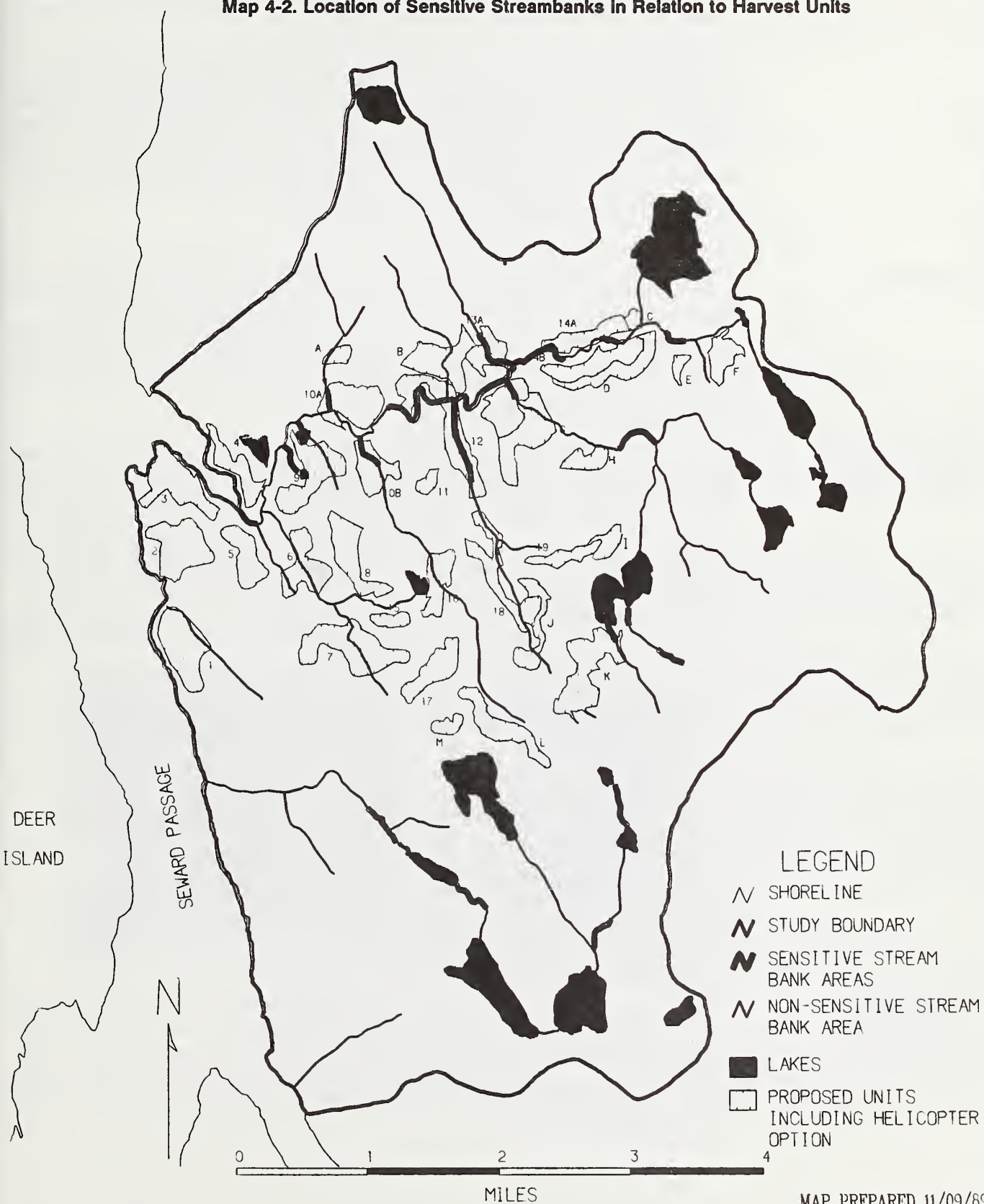
Table 4-10. Length of Sensitive Streambank* with Aquatic Habitat Management Unit (AHMU) Prescriptions.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Helicopter**
1 Side of Stream	0.0	0.3	0.1	0.1	0.0
Both Sides of Stream	0.0	1.8	1.6	1.2	0.1

* Streams with sensitive banks include those formed by the following process groups: low gradient floodplain; alluvial fan; mixed control, moderate gradient; placid or glide; and estuaries.

** Helicopter option may be added to alternative 2, 3, or 4.

Map 4-2. Location of Sensitive Streambanks in Relation to Harvest Units



4 Environmental Consequences

The total area harvested is approximately 10 percent in all action alternatives. This proportion is not expected to cause measurable or long term changes in water quality.

Where harvest occurs on high hazard soils, however, there is an increased risk that soil could slide into a stream. The range of time required for a slide zone to restabilize and stop producing sediment varies greatly. Some slide zones can recover in as little as three to five years while others require more time. Some become chronic sources of sediment and never recover. If a slide created a debris dam in a V-notched channel, the dam could break during a heavy rain and cause substantial channel scouring and sedimentation downstream. The risk involved here is unknown. Slides that do occur do not always reach an active stream.

Minerals

In order to obtain construction materials for roads described in Alternatives 2, 3, and 4, rock quarries would be developed at points along the road. Mining interests could examine the exposed rock formations to more accurately estimate the minerals potential of the area. Alternative 2 would expose the greatest area for examination, followed by Alternative 3, and finally, Alternative 4. Table 4-7 displays the amount of ground disturbance occurring in each alternative. The helicopter option would not require any additional road construction.

Timber Stand Productivity

One of the major benefits of timber harvest is the increased growth rate of the new trees (regeneration). In old growth climax stands, annual growth is offset by mortality so that net growth is zero (Hutchison and Labau 1975). In contrast, young-growth stands will produce, on a 100-year rotation on an average site, about double the cubic foot volume maintained in most old-growth stands (Taylor 1934). Each action alternative would improve the production of merchantable timber by converting old-growth climax stands to highly-productive, even-aged, young-growth stands.

In addition, production of merchantable wood can be further increased if, after the site is harvested and regenerated, the new stands are precommercially thinned.



Forest Plan Guidance

The Forest Plan, as a result of computer generated outputs, provides guidance on the proportion of harvest that should occur in each volume class in order to attain timber harvest goals over a 100-year rotation (see second column in Table 4-11). These figures, although they cannot be realistically attained on every timber sale, provide a way to judge the desirability of each alternative in attaining the long term timber outputs.

Table 4-11. Comparison of Volume Classes In Forest Plan Inventory and Frosty EIS Inventory.

VOLUME CLASS Board-Foot/Acre	Forest Plan Acres	Frosty EIS Acres
Less than 8,000	75	96
8-20,000	3,120	5,478
20-30,000	2,469	3,350
30-50,000	1,796	958
50,000+	0	0
TOTAL	7,460	9882

Two different methods were used to calculate the commercial forest land and operable CFL acreages. The figures in the Forest Plan were based on the analysis of 240 photo points from aerial photographs. The figures in this EIS were developed from a more recent and detailed inventory which was put into a computerized database. The newer database is considered to be more accurate for the Frosty study area. The difference in inventory methodology explains some of the apparent inconsistencies between data sets (see Table 4-11).

Timber Economics

The purpose of a financial analysis is to provide a means of comparing the short-term costs and revenues for each alternative. In this analysis, the net value of each alternative was derived by subtracting all production costs, including an allowance for profit and risk, from end-product selling values.

Timber markets vary during the timespan between planning and actually selling a timber sale. It is not uncommon for timber values to change by as much as \$200 per thousand board feet during this period. Due to these market variations, the estimate of timber end-product selling value was based on a median or middle level of the timber market.

Manufacturing costs were then subtracted to determine "pond log value," or what the log is worth before processing. In addition, to test whether the sale would constitute an economic offering, an allowance for 60 percent of normal profit at the middle market level was included in determining the timber value. Woods production costs were then subtracted from this value in table 4-12 to arrive at the total net value of each alternative. Table 4-12 shows costs and values in dollars per thousand board feet to highlight differences between alternatives.

Value exceeds cost in all three action alternatives. As a result, none of the alternatives is expected to be a deficit sale. Alternative 2 is the most cost-effective, followed by Alternative 3. Alternative 4 is the least cost-effective. The helicopter option has the highest yarding cost but does not require any additional road construction. When added to each action alternative, the helicopter option provides more revenue to offset road-building costs. This reduces the cost per thousand board feet and increases the net value. These values and costs may differ from the final appraisal rates but they do provide an economic basis for comparing the alternatives.

Table 4-12. Timber Values and Costs to an Operator of Average Efficiency.

ECONOMIC FACTOR	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Helicopter
VALUE (\$/MBF) (pond log minus 60% normal profit)	0	292	296	296	295
COSTS (\$/MBF)					
Stump-to-Truck	0	124	126	126	171
Specified Road	0	66	86	94	0
Spur Road	0	38	33	33	0
Truck Haul	0	7	7	8	10
Water Haul	0	23	23	23	23
Total Costs	0	258	275	284	204
NET VALUE (\$/MBF) (Possible Return to Government)	0	34	21	12	91
VOLUME HARVESTED (MBF)	0	28,000	22,000	17,000	12,000
VALUE (Thousand \$) (Possible Return to Government)	0	952	462	204	1092

Employment

The number and value of jobs provided by the harvesting and processing of timber on the Frosty area is based on the following assumptions:

1. Seven jobs are generated per million board feet of timber harvest.
2. The value of each job is \$23,000 per year.
3. The secondary benefit of dollar return to communities is a seven-to-one ratio of the direct job value.

Table 4-13. Number and Value of Jobs Generated by a Frosty Area Timber Sale.

Job Factor	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Helicopter
Number Jobs Generated	0	196	154	119	84
Dollar Value (million \$)	0	4.51	3.54	2.74	1.93
Secondary Dollar Value (million \$)	0	31.57	24.78	19.18	13.51

Alternative 2 would generate the most jobs, followed by Alternative 3 (see Table 4-13). Alternative 4 would generate the fewest jobs. There is a proportional increase in jobs when the helicopter option is added to Alternative 2, 3, or 4.

Transportation

Forest roads in the Frosty timber sale are classified as either specified or spur roads. The differences are related to the length of road and the length of service life.

Specified roads serve as the primary transportation link in the sale area. They provide access to each of the harvest units and link the units to the log transfer facility. Following the initial entry described in this EIS, specified roads would also be used in future timber harvest entries in 30 to 50 years. Their location is specified by the Forest Service.

Spur roads are road segments that run from the specified road into the harvest units, the sort yard, and the log transfer facility. Following the initial entry, spur roads will be allowed to grow back. Their location is chosen by the contractor and is subject to Forest Service approval.

The impacts of road construction on the Frosty Study Area are related to the following factors:

1. The length and location of roads. Specified roads, while providing access, remove some land from timber production and old-growth wildlife habitat. Some erosion can be expected during the time road construction takes place (see section on fish for discussion of consequences). All specified roadbeds will be seeded immediately after use to establish a grass and clover mat to reduce long term erosion impacts and prevent alder growth. These grassed roadbeds will be used by wildlife. Spur roads will be closed by installing water bars and allowing alder to grow over the roadbeds. (See Table 4-7, p.4-13, for mileage differences between alternatives.)
2. The number of stream crossings and the amount of road constructed near streams. The construction of culverts and bridges may cause some erosion of sediment into the creeks when and where construction takes place (again, see the section on fish for a discussion of impacts). This will be a short term impact. Culverts will be left in place after harvest is completed. If a bridge is constructed, the bridge deck and stringers of the Frosty Creek crossing will be removed and the approaches stabilized before the sale is closed. This will remove easy access to the north side of the stream.
3. Number and location of rock pits required for construction materials. Rock pits, like roads, remove lands from timber production and are a long term impact.
4. Location of log transfer facility (LTF). A log transfer facility provides long term access to the area because it is the easiest point of entry not only to timber sale operations but also to future recreation users. Placement of the facility has to consider many factors. The location of the Frosty Bay LTF has already been documented in an environmental assessment and approved in a 1984 decision notice.

5. Whether or not the road system connects with any other road system. Because the road system for this and subsequent sales is not planned to be connected to any other road system, extended vehicle use on these roads is not anticipated.

Table 4-14. Consequences of Transportation System¹.

	Unit	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Specified Road Construction	mile	0	14.0	14.0	11.6
Spur Road Construction	mile	0	11.0	7.4	5.7
Estimated Number of Rock Pits ²	unit	0	15	13	11
Estimated Quantity of Road Rock ³	cubic yards	0	320,000	284,000	231,000
Log Transfer Facility	unit	0	1	1	1
Estimated Quantity of Rock	cubic yards	0	5,000	5,000	5,000
Estimated Land Removed From Timber and Wildlife Production ⁴	road acres	0	87	87	72
	rock pit acres	0	7.5	6.5	5.5
	TOTAL ACRES	0	94.5	93.5	77.5

¹ The helicopter option would not require any additional road construction.

² Based on 1 rock pit every 1.75 miles of total road system plus 1 for initial starting point

³ Based on total road system using 15,000 cubic yards for specified roads and 10,000 cubic yards for spur roads per mile of road

⁴ Based on an average of 6.2 acres per mile for specified roads and an average rock pit size of ½ acre.

Natural conditions of the landscape will be altered by construction and, depending on the nature of rock sources, may create contrasting soil color. This may be noticeable on roads constructed on the mid-slope of steep ground. Some of the consequences of transportation systems are described for each alternative in Table 4-14.

Monitoring

In preparing the Frosty Timber Sale, specialists used on-the-ground inventories, computer inventories, and aerial photographs to prepare cards for each harvest unit. Cards were also prepared for each segment of road. Resource specialists wrote their concerns on the cards and then described how the concerns could be addressed in the design of each unit and road segment. These documents will be used as guidelines in monitoring the harvest of timber in the Frosty area.

Following completion of harvest activity, development impacts will be compared to those described in the Frosty EIS to identify significant differences from what was anticipated. Once again, this information, when and where pertinent, will be noted and added on the unit and road cards. By the end of the timber sale activities, the cards will document the initial plan, the rationale for any changes, and show the project as implemented.

Energy Requirements

The amount of energy needed to implement the harvest of timber on each alternative is based on the following assumptions:

1. The rate for timber sale preparation and administration is 0.5 gallon per thousand board feet.
2. The rate for high-lead logging is 2 gallons per thousand board feet.
3. The rate for loading and hauling by truck and for water transport is 8 gallons per thousand board feet.
4. The rate for road construction is 4,000 gallons per mile.
5. The rate for road maintenance is 20 gallons per mile.
6. For the helicopter option, a Bell 214B helicopter would use 160 gallons per hour and would yard 20,000 board feet per hour.

Table 4-15 shows the energy used for each action alternative:

Table 4-15. Estimated Fuel Consumption for Each Alternative on the Frosty Timber Sale.

Fuel Consumption	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Helicopter*
Thousands of gallons	0	395	317	248	96
Average gallons/mbf	0	14.1	14.4	14.6	8.0
Average/mbf with helicopter option added to Alt. 2, 3, & 4.	0	12.3	12.1	11.9	NA

*The helicopter option would lower the rate of energy use for each alternative because more volume would be added for the same amount of road.

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List of Preparers

List of Preparers

Members of the interdisciplinary team (IDT) responsible for conducting the Frosty Study Area analysis and preparing the Environmental Impact Statement are listed alphabetically below:

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List of Agencies, Organizations, and Persons to Whom Copies were Sent

List of Agencies, Organizations and Persons to Whom Copies of This Statement Were Sent

The following organizations and individuals are on the mailing list to receive the Draft EIS:

Agencies

Alaska Department of Fish and Game
Alaska Division of Governmental Coordination

U.S. Environmental Protection Agency
U.S. Department of Interior, Office of Environmental Project Review
U.S. Fish and Wildlife Service

Organizations

Thoms Place Homeowners Association
Wrangell Chamber of Commerce
Olive Cove Homeowners Association
Southeast Alaska Conservation Council
Alaska Pulp Corporation
Ketchikan Pulp Company
Wrangell Fish and Game Advisory Committee

Individuals

Frank and Vivian Grossardt
Joel and Alice Hanson
Jacquelyne Hunley
Barb and Mike Rugo
Honorable Lloyd Jones
Honorable Robin Taylor
Honorable Cheri Davis
Mr. and Mrs. Greg Rice
Mr. Raymond Chapman
Mr. Edwin Haynes
Mr. and Mrs. Steve Peavey
Mr. R. Rathbone
Mr. Peter Branson
Mr. Peter Rice

Glossary

Glossary

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 national wilderness areas in southeast Alaska.

Anadromous

Refers to those fish, usually salmonids, that spawn (some also rear) in freshwater and mature in saltwater.

Aquatic Habitat Management Unit (AHMU)

An area of stream and associated streamside habitat having fish values of such importance that land use activities will be prescribed to meet the management goals for fish habitat.

Buffer Zone

An area surrounding a special feature in order to protect it from development.

eagle nest trees: 330 foot radius around eagle nest trees

cultural sites: as needed

Carrying Capacity

The number of animals that an area can maintain in a healthy condition.

Commercial Forest Land (CFL)

Commercial forest land is land that can produce at least 8,000 board-feet of timber per acre in one hundred years.

Cultural Resource

Any evidence of mankind's activities and behavior; includes data from archeology, architecture, ethnology, and history.

Dispersed Recreation

Outdoor recreation use occurring outside a developed recreation site; includes such activities as scenic driving, hunting, backpacking, and boating.

Estuary

For purpose of this EIS process, estuary refers to the relatively flat, intertidal, and immediate upland areas, generally found at the heads of bays and mouths of streams. They are predominantly mud and grass flats and unforested except for scattered spruce or cottonwood.

Floodplain

The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands, including, at a minimum, that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given area.

Inoperable Timber

Timber which is not practical to harvest because of potential resource damages, economic infeasibility, physical limitations or inaccessibility.

Interdisciplinary Team (IDT)

A group of individuals representing different areas of knowledge and skills focusing on the same task, problem, or subject.

Irretrievable Commitment

The production or use of renewable resources that is lost because of allocation decisions. It represents opportunities foregone for the period of time that the resource cannot be used.

Irreversible Commitment

Commitment of resources that are renewable only over a long period of time, such as soil productivity, or to nonrenewable resources, such as cultural resources or minerals.

Land Use Designation (LUD)

The method of classifying land use by the Tongass Land Management Plan. Land uses and activities are grouped together with a set of coordinating policies, an essentially compatible combination of management activities. A brief description of the four classifications follows:

LUD I: Wilderness areas.

LUD II: These lands are to be managed in a roadless state to retain their wildland character, but this designation would permit wildlife and fish habitat improvement, utility corridors, and primitive recreation facility development and roads under special authorization.

LUD III: These lands are to be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.

LUD IV: These lands will provide opportunities for intensive resource use and development. Emphasis is primarily on commodity or market resources.

Log Transfer Facility (LTF)

A facility located where the road network terminates at saltwater. May be used for a number of transportation purposes. For timber harvesting, the log transfer facility is where logs are bundled and placed into rafts on the water for towing to local mills.

Mass Failures or Mass Movement

The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture, and does not include individual soil particles displaced as surface erosion.

MBF and MMBF

Thousand board feet and million board feet, respectively.

Mining

Includes all operations (prospecting, exploration, development) for the extraction of mineral resources--underground, placer, and open pit mines; rock, and sand and gravel borrow, etc.

Mitigation

Action or actions taken to avoid or minimize negative impacts of a management activity. Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Monitoring

Following a course of events to determine what changes occur as the result of an action.

NEPA

National Environmental Policy Act of 1969.

NFMA

National Forest Management Act of 1976.

Non-Commercial Forest Lands

Lands with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

Recreation Opportunity

The availability of real choice for recreationists to participate in a preferred activity within a preferred setting, in order to realize those satisfying recreation experiences which are desired. Recreation opportunities are often described in terms of six classes of opportunity:

Primitive: The most remote, undeveloped, and inaccessible opportunities. Generally includes areas out of sight and sound of human activities and greater than three miles from roads or waterways open to public travel.

Semi-Primitive, Non-Motorized: Limited opportunities for isolation from the sights and sounds of humans, and a high degree of teneration with the natural environment. Generally includes those areas greater than 1/2 mile and less than three miles from waterways, with roads and trails open to motorized use.

Semi-Primitive, Motorized: Predominantly unmodified natural environment with minimum evidence of sights and sounds of humans with primitive roads and trails open to motorized use. Generally includes areas less than 1/2 mile from waterways. Roads are not maintained.

Roaded, Natural: Predominantly natural environments with moderate evidence of sights and sounds of humans. Includes areas less than 1/2 mile from roads open to public travel, railroads, waterways, major powerlines and within resource modification areas.

Rural: Includes those areas within small communities, developed campgrounds, developed ski areas, and administrative sites. Modifications are primarily to enhance specific recreation activities. Sights and sounds of humans are readily evident.

Modern-Urban: Substantially urbanized environments, although the background may have elements of a natural environment. Renewable resource modifications and utilization practices are common. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant.

Resident Fish

Fish which are not anadromous and which reside in fresh water on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat and rainbow trout.

Riparian Ecosystems

Includes wetlands, streams and lakes, and those areas around streams and lakes which can influence the aquatic environment.

Rotation

The planned number of years between the formation of regeneration of a stand and its final cutting at a specified stage of maturity.

Sedimentation

Addition of fine organic or inorganic material to a stream channel. Usually that portion remaining in the streambed gravel.

Sensitivity Levels

A measure of viewer interest in scenic quality of the landscape as seen from roads, trails, waterways or other travel routes and from facilities or other areas of the national forest that have significant public use. Level 1 has the highest sensitivity, level 3, the lowest.

Temperature-Sensitive Stream

Those streams flowing out of lakes or muskegs, or for some other reason susceptible to warming beyond a tolerable level for fish.

VCU - Value Comparison Unit

A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established to provide a common set of areas for which resource inventories could be conducted and resource values interpretations made.

Visual Quality Objectives (VQO's)

VQOs are standards for visual quality which reflect the varying degrees to which the landscape may be modified. The standards are based upon viewing distance, the character of the natural landscape, and the public's concern for scenic quality.

"Inventory" VQO's have not yet undergone trade-off analysis relative to other resources.

"Adopted" VQO's reflect analysis involving other resources and become management direction in a selected and approved land management alternative. The five visual quality management objectives are:

Preservation - Allows only ecological changes. Management activities, except for very low visual impact recreation facilities, are prohibited.

Retention - Provides for management activities which are not visually evident. Management activities are permitted but the results of those activities on the natural landscape must not be evident to the average viewer.

Partial Retention - Management activities may be evident to the viewer, but must remain visually subordinate to the surrounding landscapes.

Modification - Management activities may visually dominate the original surrounding landscape but must borrow from naturally established form, line, color, and texture.

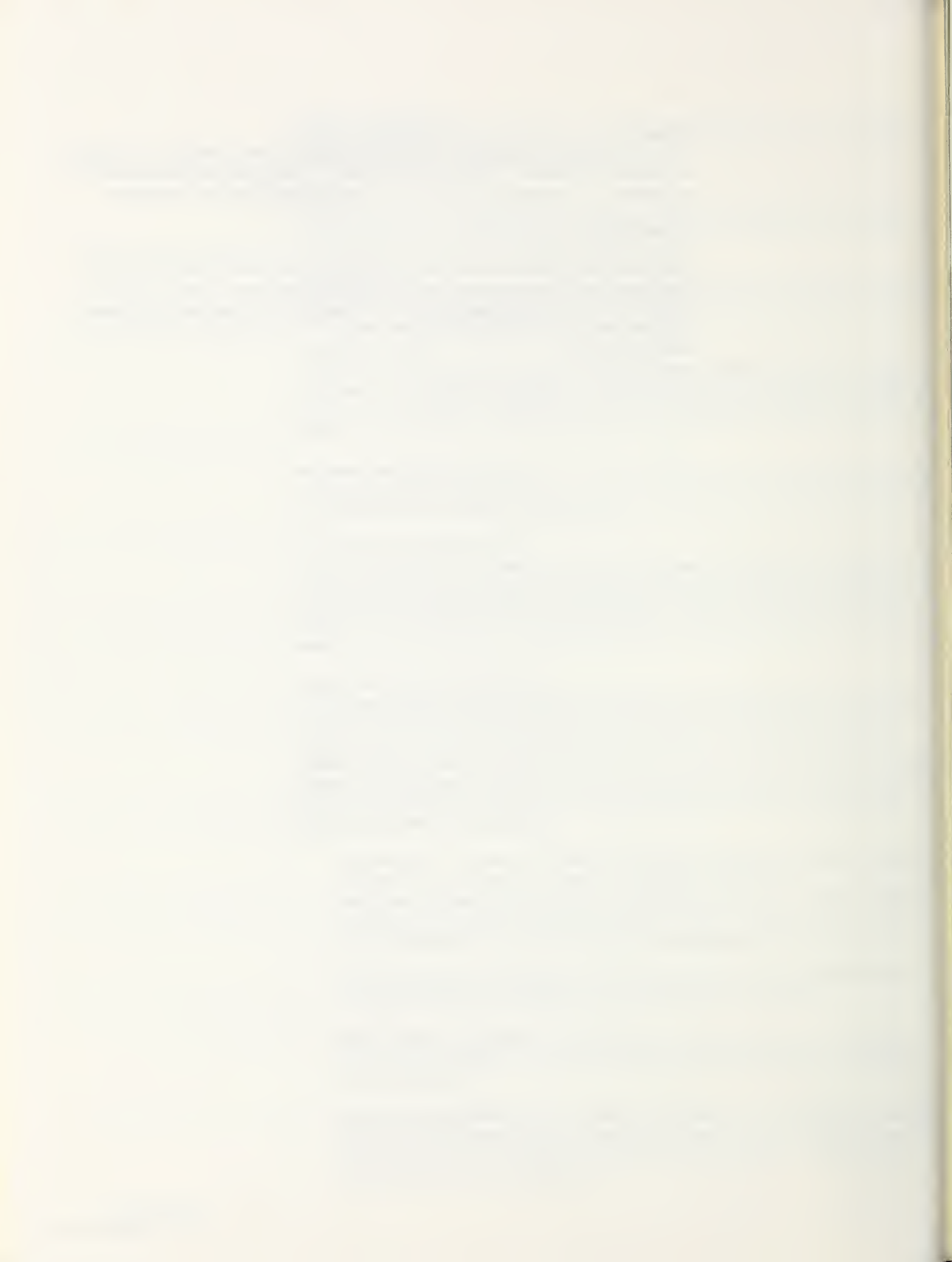
Maximum Modification - Land management activities can dominate the natural landscape to a greater extent than in the modification objective except as viewed from background when visual characteristics must be those of natural occurrences within the surrounding area.

Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Winter Range

Areas used by animals from December through March, when many sources of food are covered with snow. For deer, winter range is generally found below 1200 feet elevation on north-facing slopes and below 1500 feet elevation on all other slopes. During severe winters, the greatest number of deer can be supported by high-volume, old-growth stands on south-facing slopes, below 500 feet elevation and within 1/4 mile of salt water.



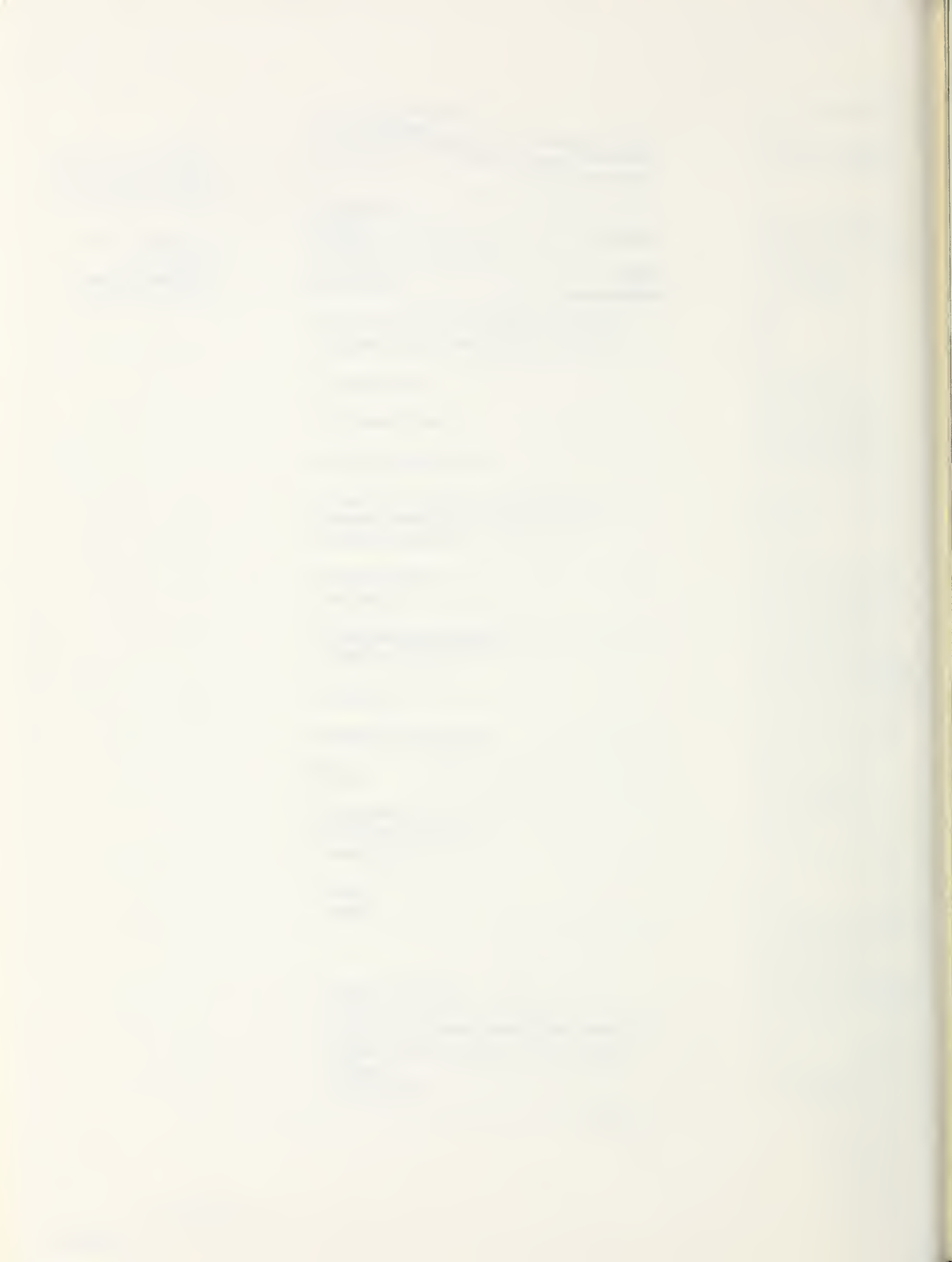
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**Appendix A: Decision Notice
Cleveland Timber Sale**

**Appendix B: Decision Notice
Log Transfer Facility**

Appendix C: Mitigation of Visual Impact

Appendix D: Road Management Objectives

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APPENDIX A

DECISION NOTICE CLEVELAND TIMBER SALE

Decision Notice
and
Finding of No Significant Impact

Cleveland Timber Sale
Wrangell Ranger District
Tongass National Forest, Stikine Area
Alaska

An Environmental Assessment discussing the proposed Cleveland Timber Sale is available for public review in the Forest Service District Office in Wrangell and the Supervisor's Office in Petersburg, Alaska.

The study was conducted in accord with the Alaska Regional Guide and the management direction and emphasis of the Tongass Land Management Plan and Management Area Analysis.

The proposed sale is located on the Cleveland Peninsula along the Seward Passage of Ernest Sound. The activity is within the Frosty Value Comparison Unit (VCU 524) as identified in the Tongass Land Management Plan.

The alternatives considered included a No-Action alternative and four alternatives that ranged from an estimated 26 MMBF to 41 MMBF of sawlog volume to be harvested.

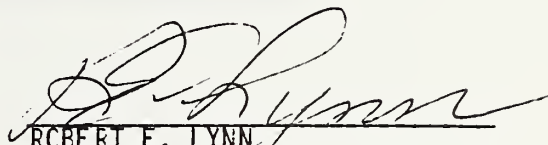
Based upon the analysis and evaluation described in the Environmental Assessment, it is my decision to proceed with Alternative D which proposes to harvest an estimated 31 MMBF of sawtimber by cable systems. Logs will be hauled to a Terminal Transportation Facility in Frosty Bay for transfer to saltwater. Approximately 14 miles of specified road will be constructed.

Alternative D, with standard mitigation measures to stabilize exposed soils and prescriptions to artificially regenerate harvested areas if necessary, provides the best combination of physical, biological, and economic benefits and is the Forest Service preferred alternative. Three of the 19 proposed cutting units are not expected to meet the assigned Visual Quality Objectives until the new trees are established. These harvest areas will be visible from Ernest Sound and Seward Passage. Six of the 19 proposed cutting units would exceed 100 acres but be less than 150 acres in size. The designation of these cutting units is in conformance with the Alaska Regional Guide.

I have determined through the environmental analysis that this is not a major Federal action that would significantly affect the quality of the human environment; therefore, an Environmental Impact Statement is not needed. This determination was made considering that the project: (a) conforms to Federal laws, Forest Service policy, and relevant State laws; (b) conforms with the Tongass Land Management Plan and the Stikine Area 5-year Timber Action Plan; (c) affects no known threatened or endangered plants or animals; (d) is consistent with the Alaska Coastal Management Program, and (e) will not significantly affect subsistence use or resources in the area.

This decision is scheduled to be implemented by offering the timber for sale in 1986 and is subject to administrative review (appeal) pursuant to 36 CFR 211.18.

10/24/84
Date


ROBERT E. LYNN
Forest Supervisor
Box 309
Petersburg, AK 9983

APPENDIX B

DECISION NOTICE LOG TRANSFER FACILITY



DECISION NOTICE AND
FINDING OF NO SIGNIFICANT IMPACT
FROSTY BAY TERMINAL TRANSPORTATION FACILITY

USDA Forest Service
Tongass National Forest

An Environmental Assessment that discusses construction of a terminal transportation facility (TTF) at Frosty Bay is available for public review at the Wrangell Ranger District Office in Wrangell, and the Stikine Area Supervisor's office in Petersburg, Alaska.

The Wrangell Ranger District, Stikine Area, Tongass National Forest, proposes to construct this facility located on the mainland approximately 32 air miles southeast of Wrangell, Alaska.

The analysis process was a systematic, interdisciplinary team (IDT) approach in accordance with the National Environmental Policy Act (NEPA) and the management direction of the Tongass Land Management Plan.

Four alternative locations were considered. Two were on either side of Frosty Bay near the mouth. A third was in the small bay just outside and to the south of Frosty Bay. The fourth was along Seward Passage approximately 1 mile south of Frosty Bay.

Three alternative types of facilities were considered for each location. These were a bulkhead, a conveyor, and a ramp.

Based on the analysis, the evaluation described in the Environmental Assessment, and other data, it is my decision:

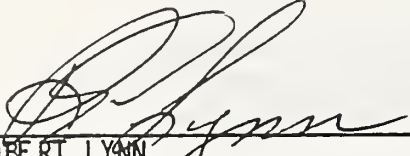
1. To construct a TTF at Site 2 located on the south shore of Frosty bay near the mouth of the bay.
2. To build a temporary log crib bulkhead which would accommodate an A-frame, gantry, crane, or other similar devise capable of lifting logs into the water.

The Enviornmental Assessment indicated the TTF should be constructed at Site 2, and that a permanent conveyor should be built at this location. The analysis was based on an estimate of approximately 100 MMBF of operable timber tributary to the TTF. Subsequent timber inventories have reduced the estimate to approximately 50 MMBF. A majority of the normal operable volume will be harvested during the initial timber sale. The small amount of remaining volume, which may be harvested with small sales, does not constitute a long-term need for a permanent conveyor; I have therefore, selected a temporary log bulkhead to satisfy the needs for the initial timber sale.

I have determined through the Environmental Assessment that this is not a major federal action that would significantly affect the quality of the human environment; therefore, an Environmental Impact Statement is not needed.

This facility is scheduled to be constructed in conjunction with the Cleveland Timber Sale which will be offered for sale in 1986. The TTF will likely be built in 1987.

This decision is subject to administrative review (appeal) pursuant to 36 CFR 211.18.



ROBERT LYNN
Forest Supervisor

8/6/84

Date

Frosty Bay LTF description: Construct a shot rock filled log cribbed bulkhead transfer facility requiring 1,600 cubic yards of fill that would measure 190' wide at the front of the bulkhead, install an A-frame or crane, and construct a 500' X 1,056' log boom rafting area with a 30' X 50' log gear raft moored to a boom to aid in the harvest and transport of timber.

Monitoring:

COE -- That the applicant must obtain Environmental Protection Agency National Pollutant Discharge Elimination System authorization prior to operating the log transfer facility.

EPA -- In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33USC, Section 1251 et seq.: the "Act"), United States Forest Service, is authorized to discharge logs and bark associated with a log transfer facility to Frosty Bay, (Seward Passage) in accordance with the General Discharge Limitations, Best Management Practices, monitoring and reporting requirements, and other conditions set forth herein (SEE PERMIT FOLDER FOR COMPLETE PERMIT [18 PAGES]). This permit shall become affective on June 27, 1986. This permit and the authorization to discharge shall expire at midnight, June 27, 1991.

ADGC -- 1. No fill shall be placed nor drilling occur below the extreme high tide line during the period April 1 through May 31.

2. Fill shall be placed only during low tide or when fill areas are dewatered.

3. Blasting shall not be permitted during the periods April 1 through May 31 and July 15 through September 1.

4. Blasting shall be conducted when the tidal stage is at or preferably below the zero tideline.

5. Blasting shall be conducted to preclude overpressure in adjacent waters from exceeding 2 pounds per square inch (psi).

6. A double A-frame or crane shall be used to preclude violent entry of logs into marine waters.

7. Logs shall be stored in water no less than 40 feet in depth at mean low water.

ADL -- This easement shall be for a term of 15 years (dec. 15, 2000), unless abandoned by the Grantee, terminated by the Grantor for cause, or terminated by mutual ageement between the Grantor and the Grantee. For the purpose of termination, "cause" is defined as a breach of any condition of the Grant, which the Grantee fails to correct within thirty (30) days written notice served upon the Grantee at its address of record. Abandonment is defined as the unexcused failure of the Grantee to use the easement for its intended purposes for a period of one year.

APPENDIX C

MITIGATION OF VISUAL IMPACT

MITIGATION OF VISUAL IMPACT

Rock Pit near Log Transfer Facility

Objective: To meet a VQO of Modification in the foreground distance zone (0 - ½ mile) as seen from Frosty Bay by screening rock pit with vegetation.

- (a) Maintain existing vegetation between road and beach in front of rock pit.
- (b) Store overburden where it will be screened to views from Frosty Bay.
- (c) Return overburden to pit floor and seed. If topography allows, store overburden along western edge of pit, push down over backwall, and spread over pit floor. The intent is to allow soil to catch in ledges of the backwall, quickening revegetation of that wall. If a field check indicates the need for further screening, some overburden may be distributed along the entryway to the pit and planted with alder.

Helicopter Unit 'A'

Objective: To meet a VQO of Modification in the middleground distance zone (½ - 5 miles) as seen from Seward Passage by creating an alpine appearance.

- (a) Shape the downslope boundary so that trees below the unit will screen the break between forest and nonforest.
- (b) Extend the harvest unit over the top of the ridge to connect with muskeg openings above.

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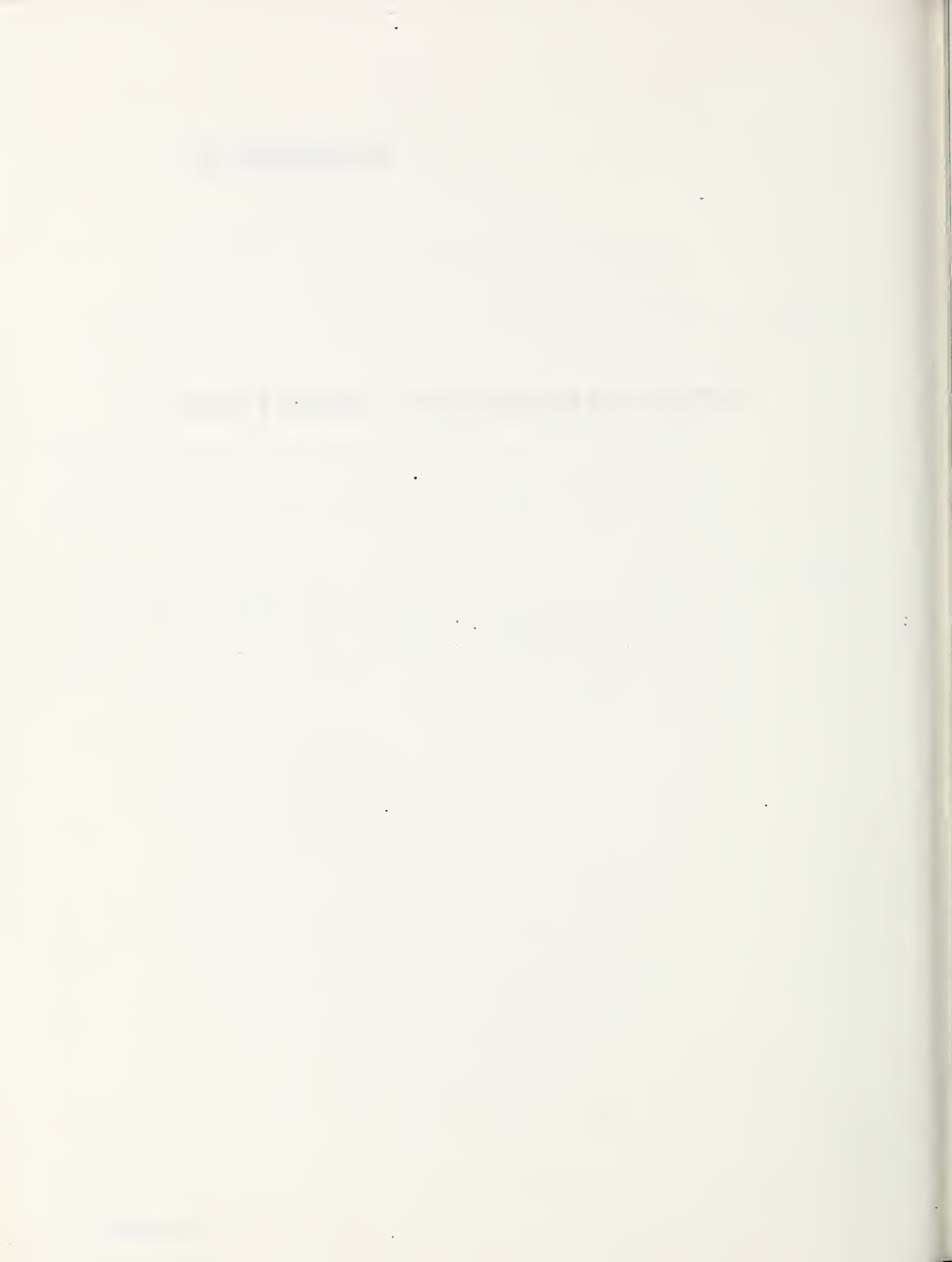
JOHN F. JOHNSON

OF THE

UNITED STATES

APPENDIX D

ROAD MANAGEMENT OBJECTIVES



ROAD MANAGEMENT OBJECTIVES

All proposed roads in the Frosty Timber Sale area would be located on lands with a Tongass Land Management Plan land use designation of IV. This land use designation allows opportunities for intensive resource use and development where emphasis is primarily on commodity or market resources.

Due to the lack of public access and the absence of developed communities, future forest development roads (also known as permanent, system and specified roads) will primarily be managed for timber resource management. Timber resource management includes but is not limited to: logging, Forest Service administration, and thinning. Access to fish and wildlife enhancement projects, as well as some recreational use of the roads by motor bikes, mountain bikes, or by foot may be provided by the road system.

Traffic will consist of logging traffic (trucks, low-boys, mobile-yarders and other logging related vehicles), Forest Service administrative traffic (pick-ups, crew rigs, etc.), and other forest contract work (thinners, fish pass construction, etc.). Some of these vehicles will be used for recreational use but the current seasonal average daily traffic generated for recreational use is estimated to be less than one vehicle per day. No increase in recreational traffic is expected within the foreseeable future.

All Forest development roads within the Frosty Timber Sale area will have a long-term service life designation. These roads so identified will be developed and operated for long-term land management and resource utilization needs.

There are three functional levels of service applicable to long-term service roads: arterial, collector and local. Arterial roads serve large land areas and provide for maximum ability for travel efficiency. Collector roads serve to collect traffic from local roads and provide both multiple purpose needs as well as travel efficiency. Local roads serve a specific resource activity usually one principal purpose for being open or operated even though minor uses exist (i.e. logging unit).

Long-term roads are also managed by their predicted cycle of entry. There are two standard cycles of entry: constant and intermittent. If the road is located in the network as to have continuous or annual recurrent use it is a constant service road. An intermittent service road is only needed for occasional use and is not used for periods that exceed one year. All Frosty Timber Sale roads are classified as intermittent service roads. Intermittent service roads are restricted to one user group (logging and Forest administrative traffic) at a time to avoid safety problems or changes in maintenance cost shares. These roads are restricted to high clearance vehicles requiring special driver skills. Intermittent service roads when not in use, will not be closed by pulling culverts, water barring or barricading the entrances.

Since all Forest development roads in the Frosty Timber Sale area will be restricted to high clearance vehicles and/or user groups, these roads will not be subject to the Highway Safety Act.

Frosty Timber Sale roads will be maintained to provide: road investment protection, adjacent environment and resource protection, operational status and user safety. Intermittent service roads will be maintained at maintenance level 3 when logging operations are in progress. They will be maintained at maintenance level 1 when not in use. This level requires basic custodial maintenance be performed to protect the road investment and to keep damage to adjacent resources to an acceptable level. Drainage facilities will be maintained.

STATE OF NEW YORK

IN SENATE

JANUARY 1, 1901

REPORT

OF THE

COMMISSIONERS OF THE LAND OFFICE

FOR THE YEAR 1900

ALBANY:

ANDREW D. LEECH, PRINTERS

1901

THE STATE OF NEW YORK

IN SENATE

JANUARY 1, 1901

REPORT

OF THE

COMMISSIONERS OF THE LAND OFFICE

FOR THE YEAR 1900

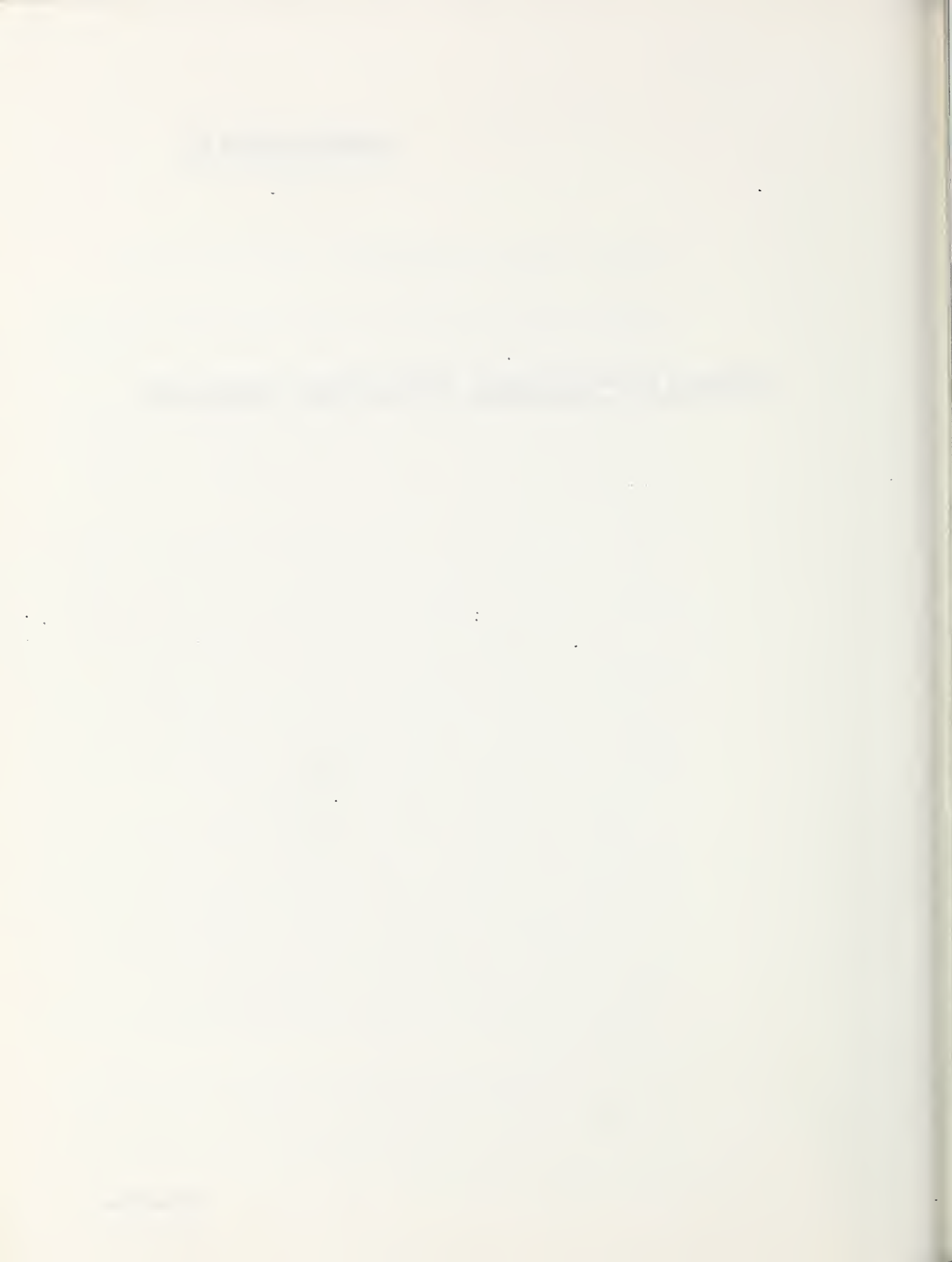
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APPENDIX E

STREAM CHANNEL PROCESS GROUPS



STREAM CHANNEL PROCESS GROUPS

The term "process group" refers to a group of stream channels that were all formed by the same geologic processes. This appendix describes nine different process groups, lists the stream channel types in each group, and explains some of the management implications of each group.

Floodplain Stream Channels

These are channels (designated as B1, C1, C3, C4, and C6 channel types in the process group delineation in Draft F of the Tongass Land Management Plan revision) with active floodplain development. Floodplain channels have a two-way interaction between the stream channel and the floodplain area through bank erosion, channel migration and overflow, leaf fall, and blowdown/tree fall. Alluvial channels process energy for the stream and are an important source of nutrients. Flooding is a fundamental process in alluvial channels. The riparian zone is usually very broad and adjacent upland plants do not directly influence the riparian areas.

The riparian areas are extremely dynamic because streamflows within alluvial or uncontained areas are generally poorly contained and flood during seasonal or individual storms. Stream channel banks consists of unconsolidated materials, either alluvial sands, gravels or organic material. Channel migration and braiding of the stream channels occurs with varying frequency, depending on bank and bed stability. The bed and bank stability are usually tied to the adjacent plants. Trees and shrubs are very important to controlling the stability of the streambanks, as their root network often is the only thing holding together the unconsolidated alluvial streambank soil. Large Organic Debris (LOD) plays an important role in controlling the stability of the stream bed and banks by regulating the stream's energy dissipation. Habitat forms in the pool riffles caused by the energy dissipation. The riparian area adjacent to the alluvial channels encompasses the channel banks, active channel floodplain, sloughs, backwater overflow channels, and ponded swales. Because of the interactions of the stream with the adjacent landform, the alluvial channels contain a richer, more abundant community of fish than found in contained stream channels.

Channels on the Alluvial Fans

These channels (designated as A3 and B5 in the process group delineation in Draft F of the Tongass Land Management Plan revision) are transitional, being streams that are dominated by both sediment transport and sediment deposition. High energy streamflows of low to moderate magnitude are delivered to fans from their upstream contained drainage basins. Flood flows which occur episodically are a result of flash floods or debris torrents delivering high volumes of sediment which are quickly deposited on the streambed, streambanks, and areas adjacent to the stream. Stream channel migration or abandonment often occurs during these events. The stream channels are numerous and are generally found throughout the fan area. Many of the channels are ephemeral.

The rearing and spawning habitat value of fan channel types for salmon and trout varies from high or low. The channels are unstable, and sometimes intermittent during low streamflow periods in the summer and winter months, thereby limiting their use for rearing coho salmon and resident trout. The gravel beds are unstable due to the high energy flows and the large amounts of coarse gravels moving through the fan channels, so successful spawning is limited. However, on the toe end, or lower gradient portions of the fans, the value is higher for spawning and rearing for coho and pink salmon. Where abundant LOD is present, the value for coho salmon can be moderate to high. The toe ends are also characterized by more stable gravel beds, thereby increasing spawning value.

Channels with "Mixed" or Colluvial Control

As the name implies, these channels (designated as B2 and B3 channels in the process group delineation in Draft F of the Tongass Land Management Plan revision) are a mixture of stream channel containment. Some segments are controlled by bedrock or the valley walls, while other areas have minor floodplains. Within these moderate gradient channel types, the bedrock segments of the channel act as sediment transport systems, while bed materials are deposited in the lower gradient and floodplain development is apparent.

The habitat capability and sensitivity of these channels to disturbances caused by management is midway between floodplain and contained channels. The importance of the interaction between the stream channel and riparian vegetation is intermediate. Much of the better rearing habitat, particularly the coho salmon winter refuge habitat, is associated with LOD accumulations in the stream. Within "mixed" channel types microhabitats that provide winter refuge may be even more important than in the alluvial streams.

Low Gradient Contained Channels

These are streams (designated as C2, C5 channel types in the process group delineation in Draft F of the Tongass Land Management Plan revision) where the channel is contained by the adjacent landform with the channel having little effect on that landform. The adjacent influence zone often extends to the slope break above the incised valley slope. The width of the zone of influence on the aquatic habitat is dependent upon the adjacent upland soils and vegetation (primarily trees). The adjacent vegetation plays a major role in controlling the rate of downslope movement of soil into the stream channels, as well as providing energy dissipation structures in the stream channels to trap and store sediment that is being transported downstream.

The lower gradient channels contain habitat for large numbers of spawning pink salmon, particularly in the lower segments where large accumulations of suitable sized spawning substrates exist. Rearing habitat, particularly winter refuge habitat, is limited to sections of the stream where large quantities of LOD have accumulated in the stream.

Moderate Gradient Contained Channels

These channels (designated as B4 and B6 channel types in the process group delineation in Draft F of the Tongass Land Management Plan revision) are also contained by the adjacent landform, with moderate instream gradients. Stream energy, substrates, and run-off are effectively contained by landform or streambank features. When the adjacent sideslopes are short, low gradient, or absent the influence zone is narrow. This group can have streams with very large, high gradient sideslopes which correspond to large areas that influence stream conditions. These streams are very much influenced by the highly sensitive natures of these sideslopes.

The moderate gradient channels contain limited amounts of anadromous fish habitat. When access is available, spawning habitat is limited due to lack of suitable sized substrates. Rearing habitat is limited to summer habitat for coho and steelhead trout. Moderate gradient contained channels usually provide moderate resident fish rearing potential.

High Gradient Contained Channels

These channels (designated as A1, A2, A4, A5, A6, A7 and B7 channel types in the process group delineation in Draft F of the Tongass Land Management Plan revision) are source streams for downstream waters and transport organic and inorganic sediments to the downstream habitats. The stream channels are well contained within the narrow valley bottoms. Channel banks are steep and generally composed

of large material, either consolidated bedrock or well packed boulders, rubble, and cobbles. The riparian vegetation along currant brush communities. The channels are predominately influenced by the upland or terrestrial plant communities. Soils in the adjacent upland area are often shallow and subject to downslope movement. Leaves, forest litter, and trees often move downslope into these incised channels when disturbance occurs.

High gradient contained streams generally do not produce anadromous fish, as numerous waterfalls and cascades prevent access. The lack of high quality rearing pools limits the production of resident fish.

Glide Streams

These channels (designated as L1 and L2 in the process group delineation in Draft F of the Tongass Land Management Plan revision) occur throughout the watershed on gently sloping lowlands landforms and are frequently associated with bogs and marshes, or lakes. Because of the low gradient, most of the sediment being transported in the stream channels is sand sized or smaller, and much of it settles out in the gently gradient channels. Though the channels are shallowly incised, and have fair flow containment, flood flows usually overtop the streambanks and flow onto the adjacent landform, lessening downstream flooding and serving as a buffer during major storms. Low gradient, slow flowing streams are often associated with temperature sensitive watersheds. The lower banks are composed of material that erodes easily. Productivity of the channel is moderately tied to the riparian/terrestrial interaction. The bank trees control the channel stability in the floodplain control areas.

Glide streams have moderate to high capability for coho salmon. Spawning gravels are not abundant, but are usually sufficient to fully seed the available habitat. The channels provide summer coho rearing habitat, but usually more limited "overwinter" habitat, due to the lack of abundant large complex pools that provide quality winter refuge. C7 channels that form the outlet channels of lakes do provide good overwinter habitat due to the temperature moderation of the upstream lake waters. The better rearing habitat, particularly winter refuge habitat is tied to undercut banks and LOD controls the long term maintenance of much of the rearing and spawning habitat. The channels are frequently used by pink salmon for spawning.

Estuarine Stream Channels

These channels (designated as E1, E2, E3 and E5 channels in the process group delineation in Draft F of the Tongass Land Management Plan revision) occur at the mouths of watersheds within estuarine landforms. The single to multiple channels are shallowly incised with fair to poor flow containment and are characterized by small alluvial material. The various channel types within the estuarine group are differentiated by channel substrate size. Sediments produced from the watershed are ultimately deposited in the estuarine channels. Consequently, they are highly sensitive to upstream management activities.

The streambanks and channel beds are composed of loose, fine textured material which are easily eroded. As a result, bank widths and depths are highly variable and bank and channel beds are stable. Sedge and marshland plants dominate the streamside and the interaction between the upland plants and the stream environment is minor. Stream migration and braiding varies, depending largely on bank and bed stability. The bed stability is critical for the production of pink salmon fry from the estuarine areas. Where the streams are excellent producers of pink salmon. These channels provide important rearing habitat for most species.

Lakes and Ponds

These types (designated as L, L3, L4 and L5 channels in the process group delineation in Draft F of the Tongass Land Management Plan revision) consist of lakes and ponds (including most beaver ponds). Lakes contain valuable aquatic habitat for some fish species, primarily sockeye and coho salmon, and trout.



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